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Perceptions of Costa Rican agricultural employers regarding skills and competencies needed by agriculturalists

Xenia Ceville Gray
Iowa State University

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Perceptions of Costa Rican agricultural employers regarding skills and competencies needed by agriculturalists

by

Xenia Ceville Gray

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This is to certify that the doctoral dissertation of

Xenia Ceville Gray

has met the dissertation requirements of Iowa State University

Signature was redacted for privacy.

Major Professor

Signature was redacted for privacy.

For the Major Program

Signature was redacted for privacy.

For the Graduate College

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ABSTRACT

During the last decade a gap has existed between the education offered by institutions of higher education in Latin America in the agricultural sciences and the concrete needs of farmers, potential employers and society. The graduates from colleges and universities in the region are not meeting the needs of agriculturally oriented national/international companies nor the demands from small farmers.

The purpose of this study was to determine the knowledge and skills needed by *Ingenieros Agrónomos* with the *Licenciatura* degree as perceived by their potential employers in the agriculture sector, namely private businesses, government and non-government agencies, and international development institution in Costa Rica.

A secondary purpose of the study was to provide information to the agricultural colleges and universities of Costa Rica regarding the desired exit profile of their graduates.

An additional purpose of this study was to develop a valid and reliable instrument which may serve as the basis for further research in other countries represented by the EARTH College population.

This was a descriptive research study which used the survey approach. The population of the study was comprised of entities (i.e., organizations, agencies, institutions, companies, and associations) that work in the agricultural sector in Costa Rica and are potential employers of agriculturalists in Costa Rica. Since a comprehensive list of all potential employers of agriculturalists in Costa Rica was not available it was necessary to obtain this information through a variety of sources. Two questionnaires were sent to each of

149 valid entities in the population. A total of 148 (49.5%) usable questionnaires were returned. Field research for this study was carried out between November 1994, and July 1995.

The data obtained provided a detailed description of the skills an agriculturalist must possess, and the profile he/she must exhibit upon graduation from an institution of higher education, as perceived by potential employers. The results indicated that there are areas that are considered more important than others. The desired profile of the agriculturalist when hired is of that of a generalist with good communications and interpersonal skills who must be skilled in production as well as post-harvest management, and have sound management skills and an interest in technology.

CHAPTER I. INTRODUCTION

Costa Rica, officially the Republic of Costa Rica, is located in Central America in a narrow strip between Panama and Nicaragua. Costa Rica is the second smallest country in Central America, covering an area of 19,730 square miles, the equivalent to 51,100 square kilometers (km). Although it could be compared in size with the state of West Virginia in the United States, Costa Rica is a little smaller. Costa Rica is bounded on the northeastern coastline by the Caribbean Sea, on the southeast by Panama, and along its 630 mile southwestern coastline, by the Pacific Ocean.

Costa Rica has a mountain range that extends from the northwest to the southeast, in effect forming a backbone down the length of the country of almost 3,000 square kilometers. This mountain range forms three plateaus: the Guanacaste, Central, and Talamanca. The majority of Costa Rica's population lives in the Central plateau region in which the capital city of San Jose may be found. This large metropolitan area is home to 60 percent of Costa Rica's total population (*World Almanac*, 1993).

The lush eastern lowlands with its Caribbean beaches are where the tropical rainforest is concentrated. Costa Rica receives between 180 and 200 inches (4.500 and 5.000 mm) average annual rainfall in its heavily forested lowland areas along the Caribbean and in the southwest along the Pacific coastline. The average temperature of this moist region is 77° F (25° C).

The Nicoya peninsula, home to the Guanacaste province, is located in the northwestern Pacific region of Costa Rica. With an average annual rainfall of 75 inches, this area is primarily made up of grassland much like the savana regions of Africa. The heavily populated Central Plateau is cooler than the other areas in Costa Rica with an average temperature of 60° F (15° C) (*World Almanac*, 1993).

Costa Rica is a mountainous country which contains an abundance of volcanic craters. Based on information reported by Sheck (1991), there are 112 craters, including the two located on Cocos Island. These craters range from extinct to dormant to active. Costa Ricans are accustomed to sharing their country with these numerous volcanoes as volcanic activity is frequent.

Even though Costa Rica is a relatively small country it has a greater variety of plants, game animals, reptiles and mammals, than in most any other country in the Western hemisphere. Unfortunately, a great part of natural rainforests were destroyed before the country established its current system protecting public areas. In 1996, national parks and other protected areas account for almost 25% of the total land of Costa Rica (Ramirez Solera y Maldonado Ulloa, 1993). Costa Rica is renowned for its stringent policies with regard to deforestation and the protection of biodiversity.

According to projections made by the *World Almanac* (1993), the population of Costa Rica in 1991 was 3.1 million persons. This population results in a population density of approximately 158 persons per square mile. This land to population ratio is considered to be high and may be a potential source of problems for the country. However, the high education level of the population helps to counteract the potentially negative effects of this ratio. Costa Rica is one of the few, if not the only Central American country, that has a high literacy rate. The literacy rate is over 90 percent. It is considered also one of the best rates among Latin-American countries (Rachowieck, 1991).

As with other countries in Latin American, Costa Rica is experiencing a migration of people from the rural to the urban areas. This urban migration trend is a constraint to the

economy of the country. Several areas are strongly affected by this situation. One area that has felt the greatest impact is the public education system. Severe pressures have been placed on all educational resources, particularly on facilities and materials (*South America, Central America and the Caribbean*, 1991).

Regarding Costa Rica's educational system, the Political Constitution established that basic education is compulsory and free; provided by the federal government. An additional educational mandate for the government is the requirement to provide scholarships to those who cannot afford to pay for higher education.

The educational system in Costa Rica covers two sectors: a formal sector, and parallel systems. The formal sector covers four levels: (1) kindergarten that covers at least one year; (b) basic education that covers nine years and is divided into three cycles; (c) diversified education which covers a series of options that have a duration of between two and three years; and (d) higher education in which the duration varies according to the area studied and the degree(s) earned. The parallel system is geared to adults and it covers areas such as agriculture, culture, sports, sex and family education (Guier, 1984).

Costa Rica's economic system is based on agriculture, even though according to Rachowiecki (1991), until the middle of the 19th century Costa Rica was a very poor country that had a subsistence agricultural system. This situation changed for the country when crops such as coffee, bananas and sugar cane provided the alternative of exporting these products and improving the economy of the country. Beef was also a commodity which was added as an export item. Technology in both refrigeration and in transportation played a key role in the transition of Costa Rica's economy as it allowed for the exportation of these items.

According to the *Countries of the World and their Leaders Yearbook* (1991), 32% of the population of Costa Rica work in agriculture. The publication, *Desarrollo Socioeconómico y el Ambiente Natural de Costa Rica, Situación Actual y Perspectivas* (1991), establishes a linkage between agriculture and industry. According to the *Almanaque mundial 1998* (i.e., *World almanac*), agriculture and industry contributed to 41% of the gross national product (GNP) of Costa Rica, of which agriculture's share was 36.6%.

According to Guier (1984), Costa Rica is fundamentally an agricultural country, which is a strong reason why agricultural education is an area with great importance in the educational system in Costa Rica. This is especially true in those areas of the country where income is based primarily on agricultural production. The fact that education in agriculture is included in the basic education programs at the primary level, at the high school level, and at the higher educational level, is a testimony to its importance in this largely agrarian based economy.

In Costa Rica the *Universidad de Costa Rica* (UCR), *Universidad Nacional Autónoma* (UNA), *Instituto Tecnológico de Costa Rica* (ITCR), *Escuela Centroamericana de Ganadería* (ECAG), *Escuela de Agricultura de la Región Tropical Húmeda* (EARTH), *Universidad Nacional de Educación a Distancia* (UNED), and *el Instituto Nacional de Aprendizaje* (INA) teach agriculture and issue degrees in this area.

Purpose and Objectives of the Study

The purpose of this study was to determine the knowledge and skills needed by *Ingenieros Agrónomos* with the *Licenciatura* title as perceived by potential employers in agricultural related businesses, governmental and non-governmental agencies as well as the international development sector of Costa Rica. For the purposes of this study *Ingenieros Agrónomos* with the *Licenciatura* will be referred to as an agriculturalist. A secondary purpose of the study was to provide information on the needs of the agricultural sector and related industries with regard to the desired graduation profile of an agronomist. This information will be used by the EARTH College to make appropriate decisions regarding potential curriculum revisions.

An additional purpose of this study was to develop a valid and reliable instrument which may serve as the basis for further research in other countries represented by the EARTH College student population. A list of countries represented by students at the EARTH College are found in Appendix A.

The objectives of this study were fivefold:

1. Identify technical skills required for employment in the agricultural sector as perceived by the individuals, businesses, and organizations which are considered to be potential employers of agriculturalists in Costa Rica.
2. Identify knowledge required for employment in the agricultural sector as perceived by the individuals, businesses, and organizations which are considered to be potential employers of agriculturalist in Costa Rica.

3. Identify specific information regarding skills and knowledge perceived as important by potential employers of EARTH graduates to be used in the College's on-going general curriculum review.
4. Identify information that will reflect specific areas of perceived importance in the agricultural sector of Costa Rica in order for the College administrators to identify subject specialty areas as senior year elective courses.
5. Determine and verify the instrument validity in order to replicate this study in other countries in Latin America from which the EARTH College has students represented.

Need for the Study

A recent study conducted by the Food and Agriculture Organization of the United Nations (FAO) and the Latin American Association for Higher Agricultural Education (ALEAS) stated there is a wide-spread difference between the education which is offered by institutions of higher education in Latin America in the agricultural sciences and the concrete needs of farmers (FAO & ALEAS, 1991). This is particularly true when it comes to the needs of small farmers. In the publication, *Educación agrícola superior en América Latina: Sus problemas y desafíos,* (FAO & ALEAS, 1991), the authors state that colleges and universities are not meeting the needs of national and international companies which hire young professionals graduating from agricultural educational centers.

The FAO and ALEAS studies suggest that the job market requires professionals with an educational background which would enable them to be entrepreneurs or independent business men and women. It is also highly desired that agricultural college graduates be

qualified to work for private companies. In addition, graduates should possess the knowledge that would provide them with the skills necessary to assure an effective job performance in institutions that provide services, as well as those that have to deal with other areas in the agricultural sector such as cooperatives, etc. (FAO & ALEAS, 1991).

Nagel (1992) states in his publication, *Educación de adultos, agricultura y desarrollo rural, los Nuevos desafíos*, that education plays a key role in economic and agricultural development in Latin America. It is Nagel's belief that education must be appropriate to the reality of the working environment. This is critical when designing strategies to help develop rural areas of Latin America.

Schneider and Suter (1989) discussed the desirable skills and attributes of entry-level employees and their relative importance for success in business as perceived by agricultural sector leaders in Australia, Canada and the United States. They concluded that, "the relative importance of various skills and attributes with respect to the general success of an employee were similar across the three countries" (p. 37).

Agricultural sector curricula in institutions of higher learning must include educational activities which develop interpersonal and communication skills. These skills, in turn, must be integrated with high-quality courses in business and economics. Technical skills, although important, must be carefully matched to students who want to work in specific industries (Schnider & Suter, 1989).

Sledge (1989), in his article "Catalyst for changing future globalized curricula in the food and agricultural sciences for the 21st century," states: "Institutions of higher education

must directly face the responsibility for developing human expertise for the food and agricultural sciences, including the natural resources, for the 21st century" (p. 97).

When considering the development of human expertise, it is imperative that social needs are considered in determining the basis for curricula development (FAO & ALEAS, 1991). Society requires and demands that the future graduates respond in an effective way to real agricultural problems that farmers from different backgrounds confront on a daily basis. These requirements and demands are not only focused on opportunities for employment, but also on societal needs (FAO & ALEAS, 1991).

It is the responsibility of universities and colleges preparing future agronomists to define these social demands and requirements through critical assessment. The focus of such a study should be on program requirements and needs which would enable future graduates to integrate professionally. Such integration would not only benefit the graduates, but also the farmers and the local communities (FAO & ALEAS, 1991).

It was found that there has not been a national study conducted in Costa Rica by any of the institutions of higher education or any other related institution in the last 10 years that focuses on the market for graduates as agriculturalists. A review of available information was conducted among the universities in the country. In addition, officials from the National Council of Deans of Costa Rican Universities and from the National Association of *Ingenieros Agronomos* of Costa Rica, were interviewed. They indicated that there were no studies regarding these issues in the area of agriculture.

Background

The economy throughout Latin America is, for the most part, based upon agricultural activities. Costa Rica is not different from the rest of Latin American countries. The agricultural sector of the Costa Rican economy is still of primary importance as it provided jobs to 28% of the work force and contributed to 18.4% of the gross national product in 1989. A good example of this importance is that it is reported that 22% of Costa Rica's land area is given over to crops, 36% to pasture and 40% is forested. The main problems in the agricultural sector in Costa Rica are centered around poor infrastructure and the downsizing of total public investment agriculture from 16% in 1975 to approximately 10% in 1980. An additional factor is the falling world prices for the main export crops (*South America, Central America and the Caribbean*, 1991).

A factor that has a great influence over Latin American agriculture is the variation in the climate among the various countries of the region. While the humid tropics represent a small percentage of the land in the region, but as the home to a variety of unique and often endangered plant and animal life, this relatively small amount of land is quite significant (EARTH video, 1993). Costa Rica, a small country that covers less than three ten-thousandths of the earth's surface is home to 5% of all the plant and animal species known to exist. There are species still being discovered in the country's rich mix of tropical habitat (Sheck, 1991).

The agricultural practices which are utilized in many countries often contribute to the degradation of the tropical soils, forest and native species (French, 1993). An example of this fact is clear when it is considered that the forest has been the natural cover for tropical land

for as long as about two million years. However, with commercial logging and the clearing of land for agriculture and settlement, one third of the total land area in Costa Rica may still be considered to be forested, much of which lies in protected areas such as national parks. While reforestation projects on already cleared lands are essential—erosion control and watershed protection alone merit the effort—they are not going to duplicate what has been lost (Sheck, 1991).

On the other hand, universities have not been preparing agriculturalists to offer alternatives to these problems which are often caused by agriculture. There is a need to adjust the agricultural higher education system to give innovative answers to these immediate problems (FAO & ALEAS, 1991).

In the late 1980's, a study was commissioned by the W.K. Kellogg Foundation to study general educational needs of Latin America. It was determined that there is a strong need for a Pan American College which focuses exclusively on the sustainable management of the agricultural and natural resources of the humid tropic region. The United States Agency for International Development (USAID) adopted the recommendation and agreed to provide funding for such an institution. In 1989, construction began for the *Escuela de Agricultura de la Región Tropical Húmeda* (Agricultural College of the Humid Tropic Region), better known by its Spanish acronym, EARTH (USAID, 1985; USAID/*Fiduciaria de Educación Agrícola del Atlántico, S.A., 1987).*

EARTH College began classes in March, 1990, with a four year curriculum that employs a "learn-by-doing" philosophy (EARTH, 1992 p. 13). As part of the mandate which created EARTH, 30% of all educational activities must be conducted in a experiential

learning environment, generally in a laboratory or field setting. The mission statement of EARTH focuses on the preparation of youth from throughout Latin America in sustainable agricultural practices with an entrepreneurial perspective.

To be able to achieve this mandate, EARTH College has developed a curriculum that has the following integrated elements:

1. At the end of the first year of study, students should be able to develop basic concepts and abilities towards natural resources and sustainable agriculture at the farm/enterprise level. They should also have acquired a global vision of agriculture, resources, social and economic factors, with special emphasis on the humid tropics. Another objective of the plan of studies of this first year is to develop intellectual abilities and emphasize manual and mechanical skills.
2. At the end of the second year, students should have an in-depth knowledge of natural resources and sustainable agriculture of the humid tropics and be able to manage a farm/enterprise in a sustainable manner.
3. At the end of the third year, students should be able to apply knowledge and skills regarding natural resource management, sustainable agriculture related to the farm/enterprise among communities in the humid tropics in Latin America. They must be able to interact with farmers, rural family and the community. In addition, they must have an understanding of processes that take place among communities, families and the region, starting with production systems and extending to post-harvest management and a comprehension of consumer preferences.

4. At the end of the fourth and last year of study at the EARTH College, the students should be able to demonstrate their professional abilities including analysis, synthesis, critical and creative thinking in problem resolution. Also they should be able to use these same abilities to provide alternatives and solutions in sustainable agriculture, natural resource management for both the agro-industry and for the rural communities.

At the end of the four year plan of study, which includes 220 credit hours, the students receive the degree of *Ingeniero Agronomo* with the title of *Licenciatura* and are expected to return to their countries of origin. The degree of *Ingeniero Agrónomo* with the title of *Licenciatura*, based upon the European system of education, is considered to be superior to a Bachelor of Science degree (French, 1993). For the purpose of this study, the *Ingeniero Agrónomo* with the title of *Licenciatura*, will be called Agriculturalist.

It is important to note the EARTH College recently graduated its first class in December 1993, and is now completing the sixth year of instruction. With a commitment to continuous evaluation and improvement, the EARTH College maintains a continuous dialog with regard to the teaching and instruction that occurs. As such, the administrators and faculty are aware of the changing needs of not only the communities, but also of the agricultural businesses and industries. This study provided needed information with regard to the perceptions of those who will be the future employers of EARTH graduates in Costa Rica. Therefore, this study is timely and very much needed.

Implications and Significance of the Study

Alfaro (1993) mentions in his document, *Elementos para la elaboración de un proyecto curricular universitario,* that due to the fact the universities are autonomous or self-governing, change does not frequently occur. Even though these changes do not often occur, new universities with non-traditional philosophies and which vary in their curriculum from traditional universities, have begun to appear with a non-traditional curriculum. These same non-traditional institutions tend to fall into the same philosophy and patterns of the traditional universities as time passes. This is especially true if there is no evaluation of their activities, programs, content and how it is being taught in relation to the needs and expectations of potential employers (Alfaro, 1993).

FAO and ALEAS (1991), have reported in their document, *Educación superior en America Latina: Sus problemas y desafios,* that there is a gap between the educational offerings and society's demand. Universities too often educate and graduate agriculturalists based on the institution's perceptions of what is needed and not based the real and concrete needs of farmers and of those institutions that may potentially hire graduates.

This study was based upon both the lack of reliable information regarding the desired graduation qualifications of agronomists in Costa Rica and the need for this same information. As has been stated, the purpose of this study was to determine the knowledge and skills needed by agriculturalists, as perceived by potential employers in agriculturally related companies and institutions. In addition, the study provided the faculty and administration of the EARTH College with critical information that may contribute to the curriculum review process in order to ensure that graduates possess the knowledge and skills

desired by potential employers. The results of this study may also contribute to reduce the gap mentioned in the study conducted by FAO and ALEAS (1991). Finally, it may also provide higher education institutions in Costa Rica with a basis to evaluate and to decide the future trends of agriculturally related programs and their content.

Operational Definitions

ALEAS: Latin American Association for Higher Agricultural Education

Administrative Position: A position in which the individual directly represents the administration of the company, institution, organization. The individual in this position is part of the decision making process based on policies and regulations established by his/her employer.

Agricultural Sector: The group of companies, institutions, private organizations, governmental and non-governmental organizations (NGOs) that are involved in any related agricultural activity. Independent farmers are also included in this sector.

Agriculturist: For the purpose of this study, the term agriculturalist has the same meaning as *Ingeniero Agronomo* with the title of *licenciatura*. This is a professional with an agricultural degree which took four to five years to complete the program of an agricultural college or university.

Bachelor's Degree from an Agricultural High School: A degree obtained at the end of a five year program of study from an agricultural high school. Most of these high schools in Costa Rica are located in rural areas. They are designed to provide a program of study to attract high school students from rural areas and help prevent them from migrating to urban areas of

the country. The plan of study is designed to provide practical hands-on experience, allowing graduates to be able to find employment on farms and in companies in surrounding areas or to successfully manage their own farms.

Bachelor's Degree in Agriculture from a University: This degree is obtained after successfully completing four years of study at one of the four universities in Costa Rica. To obtain this degree, it is not necessary to write a thesis. This degree is not the equivalent to a *Licenciatura* degree, which requires 5 years of study.

CONARE, Consejo Nacional de Rectores: Translated from Spanish, this means The Dean's National Council. This institution was formed in 1974. In 1982, CONARE became the entity that oversees higher education throughout Costa Rica. CONARE is a commission formed by the Deans of all Land Grant Institutions of higher education. In addition, CONARE includes a representative of the Ministry of Public Education, the president of the Higher Education Planning Office as well as a student representative.

Colegio de Ingenieros Agrónomos: A professional association for agriculturalists in Costa Rica. The *Colegio* is a public entity that joins together all the agriculture professionals. Among its primary objectives are: (1) promote the development of agricultural sciences; (2) promote unity, professional, social, cultural, and economic development among its members; (3) ensure the profession will be practiced with legal norms; (4) provide advice regarding agricultural sciences and rural development to any public entity requesting assistance; and (5) cooperate with higher education institutions in the development of agriculture curricula.

EARTH College - Escuela de Agricultura de la Región Tropical Húmeda (School of Agricultural of the Region Tropical Humid, termed EARTH College in Spanish)

Entities: All public, private and governmental organizations, companies, institutions, agencies, associations, cooperatives; and others that work in the agricultural sector and are considered potential employers of individuals with a degree in agricultural sciences and related areas, which have been previously defined as agriculturalists.

FAO - Food and Agriculture Organization of the United States

Governmental Institutions: All institutions that are part of the government of Costa Rica. These may include agencies which are part of a Ministry, such as the Ministry of Agriculture. The policies and regulations under which these institutions operate come directly from the government.

Ingeniero Agrónomo: This title is obtained from higher education agricultural institutions, recognized by the Costa Rican Ministry of Education and CONARE after successfully completing a prescribed plan of study. The degree of *Ingeniero Agronomo* may be conferred with or without the title of *Licenciatua*.

Licenciatura: This degree, compared to the North American system, is considered to be a higher degree than a Bachelor's degree and less than a Master's degree. To obtain a licenciatura degree the student must successfully complete an established course of study and a graduation project which is similar to a thesis.

Non-Governmental Organizations (NGOs): Those organizations that are non-profit organizations and are international organizations. This category also includes non-profit institutions that are funded with international money

Non-traditional crops: Crops that are produced exclusively for export.

Private business: Businesses funded with private funds and not directly related to the government. Business decisions are made based on policies and regulations of the business itself.

Private sector: This is the group of companies, institutions, and organizations which are not related to the government. Their activities are generally for profit for the owner or owners of the companies, institutions and organizations.

Technical degree from a university: Roughly, the equivalent of a 2 - 3 year degree from a United States Community College.

Technical degree from an agriculture high school: After completing the five year program at an agricultural high school, there is an option of going through a sixth year and obtaining a technical degree in agriculture.

Technical position: An employment position that places an individual directly in contact with field activities. These activities could be among crops, animals, people, equipment and/or the environment.

Traditional crops: Crops that are primarily produced for consumption in the country and are not produced to be exported.

USAID - United States Agency for International Development

Summary

Agriculture in Costa Rica represents 28% of the work force (*South America, Central America and the Caribbean*, 1991), and it also contributes 36.6% of the gross national product (GNP) of the country (*Almanaque mundial*, 1998). There is a gap between perceived

needs in Latin American higher education, and what is perceived at higher education agricultural institutions, as needed by farmers, companies, institutions, agricultural society, and real needs as perceived by these entities (FAO & ALEAS, 1991). There have been no studies conducted in recent years that identify what the specific employee needs in Costa Rica are as perceived by the potential employers of future agriculturalists.

CHAPTER II. REVIEW OF LITERATURE

The main purpose of this study was to determine the knowledge and skills needed by *Ingenieros Agrónomos* with the *Licenciatura* title, referred to as "Agriculturist", as perceived by potential employers in agriculturally related businesses, governmental and, non-governmental agencies as well as the international development sector in the Central American country of Costa Rica. A secondary purpose of the study was to identify specific knowledge and skills that potential employers desire graduates to possess. This information will be used by the EARTH College in the curriculum review process.

An additional purpose of this study was to develop a valid and reliable instrument that may serve as the basis for further research in other countries represented by the EARTH College student population. As of 1996, students from over 20 countries have studied at the EARTH College.

Population

In 1988, Costa Rica had a population of 2.7 million with a density ratio of 143.49 persons per square mile (*Countries of the world and their leaders yearbook*, 1991). The *World Almanac* (1993) gave a population and density ratio estimate of 3.1 million and 158 persons per square mile for 1991. The average annual population growth rate for Costa Rica in 1987 was 2.6%. Rachowiecki (1991) summarized the population distribution in Costa Rica, saying that just over 50% of the population were males. About 60% lived on the plateau. The literacy rate of Costa Rica is over 90%, which is considered to be among the highest in Latin America.

Rachowiecki (1991) presented the population of the country by provinces:

San Jose	1,068,206
Alajuela	519,351
Cartago	328,259
Heredia	235,700
Guanacaste	234,962
Puntarenas	326,163
Limon	209,731

To give a better idea of the population density, Rachowlecki (1991) compared Costa Rica's population density with that of the United Kingdom and the United States. The population density of Costa Rica is 25% of the population density of the United Kingdom, but more than twice as high as the United States. A map of Costa Rica is found in Appendix B.

Based upon data provided by the *World Almanac* (1993) and *Countries of the World and their Leaders Yearbook* (1991), percentages on age distribution is presented in Table 1. Life expectancy for men is 67.5 years of age and for women it is 71.9 years. The birth rate is 27 per 1,000 and the death rate is 4 per 1,000 (*Countries of the world and their leaders yearbook*, 1991).

Table 1. Age distribution in Costa Rica

Age group	Percent
0 to 14	36.0
15 to 49	57.4
50 and above	6.4

Rachowiecki (1991) described the Costa Rican population as mostly white, less than 2 percent are black. Most of the blacks live in the province of Limon, on the Eastern or Caribbean side of the country. The ancestry of the black population in Costa Rica may be traced back to the early days of slavery, or to the immigration of the labor forces from Jamaica to work on the construction of the railroad and in the banana plantations in the late 1800s. Rachowiecki also mentioned there is a small number of Indians remaining in the country, less than 1%. Among these tribes are the Bribris from the Talamanca area and the Borucas in the southern Pacific coastal area.

The official language in Costa Rica is Spanish, but as mentioned previously, there are three distinct language groups in Costa Rica: Blacks that speak Spanish with an English dialect from Jamaica; Indians that speak Bribri, and Spanish (*Countries of the world and their leaders yearbook*, 1991).

Costa Rica's urban population grew from 460,000 to 760,000 during the period of 1963 to 1973. Since that time there has been a decline in the population growth rate (Denton, 1985). Even though the population growth has experienced a decline, there is still migration from the rural areas to the urban centers. This migration pattern is clear in the 1991 Statistical Survey presented in the publication *South America, Central America and the Caribbean* (1991), which reports that the urban population of Costa Rica is 790,853. There are also comments on the problems this migration presents to the country. This situation is especially problematic to those either seeking employment in urban areas or for those charged with making decisions for the national economy. Additionally problems stemming

from the growth of the urban population is severe because it places pressure on the urban educational facilities.

Officially, education is free, and elementary education is compulsory between six and thirteen years of age. Official secondary education is free but not compulsory and consists of a three-year basic set of courses, followed by a more highly specialized two year program. Attendance figures are very high. In 1987 an estimated 95% of the children age six to eleven were enrolled at primary schools, while 70% of those between age twelve and sixteen received secondary education. There are four universities in Costa Rica which are roughly equivalent to the United States Land Grant University system. One of these institutions UNED, is the "distance university". Costa Rica has several private universities, but none except EARTH College offer the degree of Agriculturists (*South America Central America and the Caribbean*, 1991; *CRESLAC-UNESCO*, 1989).

Regarding the educational system, Denton (1985) presented statistics from 1982, where he mentioned that there were approximately 35,000 university students registered in the country's universities. Fifty-five percent of Costa Ricans under thirty are high school graduates. University graduates account for 7% of the total adult population. With regards to education, the main point Denton presented is that 60% of the university graduates major in either liberal arts, law, or social sciences, yet Costa Rica is still primarily an agricultural country and its economy is based on agriculture production.

In comparison to the region of Central America, the standard of living in Costa Rica is second only to that of Panama. Economic indicators demonstrate Costa Rica entered the 1990s with increasingly strong non-traditional export commodities such as ornamental plants

and flowers, textiles, and electric components. These non-traditional exports and the associated industries are beginning to rival the traditional four exports: coffee, bananas, beef and sugar (Rachowiecki 1991).

Economic and Political Situation

According to Rachowiecki (1991), until the middle of the 19th century, Costa Rica was a very poor country with an economy based on subsistence agriculture. This situation changed when coffee, bananas, sugar, and beef provided products suitable for export. Today, these four commodities generate the major portion of the country's foreign income. In recent years tourism has become one of the major income generators for the country.

Of the 2.7 million people that live in Costa Rica, 32% work in agriculture, 25% work in industry and commerce, 38% in services and government, and 5% in banking and finance (*Countries of the world and their leaders year book*, 1991).

Historically the combination of agriculture and industry has played an important role in the formation of the Gross National Product (GNP). During 1975 to 1985, agriculture and industry contributed to more than 40% of the GNP. Of this 40%, 36.6% came directly from agriculture and industries related to agricultural production. The other sector of Costa Rica's economy which is competing with agriculture and related industry is tourism. If the income of the four principal agricultural products (coffee, bananas, meat and sugar) is compared to the income produced by tourism during the period from 1980 through 1983, it would be found that coffee is in first place, bananas in second, and tourism in third place as income

generators. Following tourism one finds meat and sugar (*Desarrollo socioeconomico y el ambiente natural de Costa Rica, situacion actual y perspectivas*, 1991).

The following figures for the five major sources of foreign currency were given by the Central Bank of Costa Rica (1985). They represent the average export income produced for the period of 1980-1985:

Coffee	US$ 341.8 million
Bananas	US$ 235.2 million
Tourism	US$ 144.6 million
Beef	US$ 60.8 million
Sugar	US$ 15.3 million

Solera and Ulloa (1988) in *Desarrollo socioeconómico y el ambiente natural de Costa Rica, situación actual y perspectiva* mentions there is a strong connection between agriculture and industry. This connection is reflected by the fact that 50% of the added value from industries comes directly from the agriculture sector. They also mention the industry in Costa Rica began when coffee, bananas, sugar and cocoa were industrialized for exportation purposes. Other products produced in Costa Rica with a potential to be exported, are corn, rice, sorghum, poultry, fruits and legumes, tobacco, beans, dairy products, and animal feed. For the most part, these commodities are not exported and are consumed by the national population. In the animal production area there are also products with the potential for industrialization. Among the principal products are processing meats (poultry, swine, beef), milk, animal blood and bones for animal feed, and processed hides for shoes and other articles (*Fundación neotropica*, 1988).

Based on the fact the tourism industry has expanded to become the third largest source of income in Costa Rica since 1979, the country has recognized the importance of tourism and has established an outstanding system of parks and reserves. The natural resources of Costa Rica are receiving worldwide attention, which has caused the tourism industry to promote nature tourism or what is referred to as ecotourism (Boo, 1990).

Costa Rica, as with the rest of Central America, went through an economic crisis that, according to an analysis conducted by Solero and Ulloa (1988), was caused by an inappropriate development model used by the country. This model was based on the fact that during 1950 to 1961, the country had an economy based exclusively on agriculture. With regard to export agriculture, there was little crop diversity. Bananas and coffee were the principal export crops, thus limiting their market. Based on this the only market available for the country were those interested in these two crops (*Fundación neotropica*, 1988). During this same time period, the government of Costa Rica was placing less emphasis on the agricultural sector and more attention to the construction of infrastructure such as electricity, water supply systems, airports, roads, telecommunication systems, etc.

One of the main driving forces of the Central American economy during the time period of 1950 to 1960's, was the Central American Common Market (CACM). This organization which is based upon the active membership of each Central American country, largely dictated the economic polices at the time. Costa Rica was a strong member of the Central America Common Market. However, during the 1960's the CACM began to lose importance in the region. In addition to this, there were other external factors which had an influence on the Costa Rican economic crisis. These factors were:

1. the international price of petroleum increased;
2. the political and economic problems in Central America, related to this the stagnation of the Central America Common Market;
3. the low added value of agricultural products;
4. the increase of production costs with fewer possibilities for external resources;
5. a change in monetary policies creating higher interest rates; and
6. the economical recession of the 1980s. (Solero & Ulloa, 1988)

All these factors greatly influenced the Costa Rican economic crisis of the 1980's and generated new problems, such as: stagnation in national production; high unemployment rates; instability in public finances; inflation; the devaluation of the currency; and the increasing external debt. In 1983, the country began the process of confronting these problems and trying to find alternatives for change. The influence and role of the government in the agricultural production system was reduced and the level of production was reactivated to its current level (Solero & Ulloa, 1988).

Costa Rica is a democratic republic with a strong system of checks and balances. The president and 57 Legislative Assembly deputies are elected for four year terms. A constitutional amendment approved in 1969 limits both the president and the deputies to one term, although a deputy may be returned to the assembly after sitting out at least one term (*Countries of the world and their leaders yearbook*, 1991). The current president, Jose Maria Figueres, assumed office in February, 1994 (*The world today series: Latin America*, 1994).

Agricultural Sector of Costa Rica

The agricultural sector of the economy is still of primary importance, due to the fact that in 1989 it provided jobs to 28% of the work force and contributed to 18.4% of the gross national product. A good example of the importance of agriculture to the Costa Rican economy is the fact that 22% of land area is given over to crops, 36% to pasture and 40% is forested. The main problems confronting the agricultural sector are poor infrastructure of this sector as evidenced by the decline of total public investment from 16% in 1975 to around 10% in 1980. During this same time period world prices for the main export crops declined. (*South America, Central America and the Caribbean*, 1991).

A good example of the importance of agriculture in the country is the fact that of the total area of Costa Rica which is 51,100 square kilometers (19,652 square miles), 394,273 hectares are dedicated to agriculture. Table 2 presents the distribution of crops for 1984 and

Table 2. Distribution of crops for 1984 and the average yield of each crop in Costa Rica

Crop	Hectares cultivated	Average yield metric tons/hectare
Coffee	111.052	5.9
Bananas	21.503	43.6
Sugar cane	25.003	58.1
Cocoa	12.470	0.4
Grains	199.423	6.8
Cotton	2.219	0.6
Potatoes/onions	2.604	NA

Source: *Censos agropecuarios*, 1984.

the average yield of each crop for the same year (*South America, Central America and the Caribbean*, 1991).

Denton (1985) gave statistics regarding land and land-holdings for Costa Rica. Of the country's farm land, 93% is cultivated by private owners with the average size being 24 hectares (10 acres). The remaining 7% of agricultural land is held by corporations or are cooperatively owned farms. Land in this latter category has an average size of 250 hectares (100 acres). The small privately owned farms which are cultivated by their owners produce only enough food for farmers and their families with a smaller amount left to sell at local markets. The corporate and/or cooperatively owned farms are oriented toward producing "cash crops" primarily for exports (Denton, 1985).

The book, *South America, Central America and the Caribbean* (1991), summarizes Costa Rica's agriculture history as follows: Bananas were Costa Rica's main export commodity until 1984, when industrial problems allowed coffee to take up the leading position. In a good year, bananas formerly provided about 10 percent of the GDP. In 1988 coffee became Costa Rica's main export commodity, representing 26% of total export earnings. Sugar and beef have also contributed significantly to the economy of the country.

Other crops and products produced by the country either for internal consumption and/or to be exported or industrialized included: meat (poultry, beef and swine); cocoa; rice; sorghum; fruits; legumes; tobacco; beans; potatoes; onions; cotton; avocados; cauliflower; peanuts; oranges; watermelon; cashews; heart of palm; plantain; beets; lettuce; cabbage; soybeans; tomato; tamarind; yucca; carrots; dairy products; animal feed; sub-products of

animal blood and bones; products made of hides; and forestry products (*Censo agropcuario*, 1984).

According to Censos Agropecuarios conducted in 1984, the total number of cattle in the country was 2,047,476. An estimated 60% of this figure correspond to beef cattle, 18% to dairy cattle, and 17.5% to cattle used for a dual purposes of both milk and meat. The remaining cattle were considered to be for reproduction (*Censo agropecuario*, 1984).

Agriculture, Agricultural Education, Curriculum and Implications to Employment Needs

In the United States of America, since the Smith-Hughes Act passed in 1917, the objectives for vocational education in agriculture did not change until the 1960's. The objectives outlined in the Smith-Hughes Act were to train prospective farmers for proficiency in farming. A change was observed in 1963, with the passing of the Vocational Education Act of 1963 which allowed vocational agriculture programs to be broadened. Vocational Agricultural programs could expand to include instruction for farm and off-farm agricultural occupations (Leising, 1976).

Skadburg (1971) and Wesson (1977) conducted research regarding attitudes toward agriculture and agricultural employment, which is similar in nature to the one conducted in Costa Rica. Both Skadburg and Wesson came to the conclusion that many people perceive agriculture only as an on-farm activity. As such there was a need to change people's attitudes towards employment in agriculture. They also mentioned that employment in agriculture included businesses and industries that provide materials and services for farmers in the production of crops and livestock. The authors recognized that employment in agriculture

included industries involved in marketing, processing, and distributing agricultural products. Transforming raw farm products into finished food and fiber products and distributing them around the world, was identified as another source of employment in agriculture.

According to Sherrard (1994), research conducted by German universities and US land grant institutions have greatly influenced the contemporary approach towards higher education in agriculture which emphasize students abilities to meet the challenges and changes of the coming decades. The changing educational policies will support increasing production and economic efficiency, but does not always take into account issues such as social equity and environmental quality.

The Food and Agriculture Organization of the United Nations (FAO) and the Latin American Association for Higher Agricultural Education (ALEAS) conducted a study in which they compared education being offered by institutions of higher education with the needs of farmers, and the needs of national and international companies. The FAO and ALEAS research concluded there was considerable difference between what was offered by colleges and universities and what was needed (FAO & ALEAS, 1991). The challenge of preparing graduates to be able to enter the work force with the skills and competencies required is an important issue in Latin America as well as in the United States. Bjoraker (1987) in his article "Concepts and philosophical issues in food and agriculture undergraduate education with basic guidelines for curricular planners," stated that innovative changes in the undergraduate curriculum are urgently needed. Bjoraker (1987) addressed this issue in the following way:

> Colleges of agricultural and life sciences are responsible for developing essential human expertise in the food and agricultural sciences. To continue to fulfill this responsibility, the curricula of the future must be sound and be able to produce the baccalaureate graduate with the necessary expertise. To achieve this goal, colleges must identify the characteristics required of a graduate 20 years in the future and must develop guidelines for a revitalized curriculum. (p. 5)

Coffey (1994) in his publication "Risking the future," contended that agricultural education has changed focus from the initial emphasis and the need to train young men to become farmers to the more comprehensive framework which focuses on a curriculum model which is community-based. Coffey mentioned that, as population dynamics change, the curriculum needs to change in order to meet these new needs. In this article Coffey also stated the United States legislation which broadened the scope of agricultural education and stated that:

> Educational reform both at state and national levels has stressed the need for integration and sequencing of courses, group problem solving, and practical applications of curricula to the real world. The School to Work Initiative illustrates the current philosophy of education where educational reform is job driven. (pp. 21-23)

Coffey described these changes as innovations in the curriculum: "Innovative curricula are the result of countless hours of trial and error by unique individuals. Innovations should reflect the changing job market" (pp. 21-23).

According to Macias (1990), Latin America is facing the same challenge as in the United States. Latin America is trying to prepare professionals in the agricultural sciences that can meet the needs of a changing agricultural sector, which is the same focus that US Vocational Agriculture is giving to agricultural studies (Macias, 1990). Following the same trend, Bjoraker (1987) added that faculty, agribusiness leaders, alumni, high school science

teachers, and students should be involved in assessing curriculum needs through an interactive process to be able to help educational institutions meet these challenges.

Harris and Birkenholz (1994) stated that agricultural education programs should prepare students for high-tech jobs for the coming 21st century. Both authors continued their comments and gave an alternative in that they considered technical preparation was designed to address the need for a highly skilled work force.

Coffey (1994) in his article "Tech Prep - Lessons learned," presented nine points for guiding effective tech-prep programs in agriculture. Among these issues, is that tech-prep is a continuous curriculum effort involving ground work laid by a planning/steering committee. Coffey presented the same point of view as that presented by Bjoraker (1987): the people that will be affected by the expertise of individuals graduating with a degree in agriculture and food science should be working on committees to guarantee these graduates will possess the skills needed to enter and compete in a globalized work force.

Sledge et al. (1987), in "Futuristic curricular models/designs for the food and agricultural sciences," commented that the food and agricultural sciences in the year 2005 need to be different than the one we have today. The authors also gave a description of what attributes our graduates of year 2005 should possess:

a. A global perspective of the food and agricultural sciences.
b. Greater interdisciplinary knowledge in the fields of biotechnology, transcending traditional departmental boundaries.
c. Greater competency in economic and business management.
d. An effective utilization and understanding of telecommunications. In addition, these attributes must include: in depth biometry and statistical application to economic matters; sophisticated problem-solving abilities; an understanding of socio-economic and geo-political factors affecting international trade; a clear understanding of ethics in agriculture; an

> understanding of systems analysis; the ability to be "adaptive" and to be a "learner" throughout their lives; mastery of effective communication skills; depth in the chosen professional areas; an understanding and appreciation of the importance of human nutrition; and knowledge to aid in the preservation and wise use of renewable resources, including environmental protection. (p. 115)

Sledge et al. (1987) also discussed the conceptual curricular planning process. They provide two curricular processes: Mission Based and Competency Based. The curricular process—"Mission Based" is defined as conceptional in nature. It is based on the premise that curriculam planning and design relate closely and consistently with the institution's mission and educational goals. The "Competency Based" curriculam process depends on two assumptions. The first one is that "curriculum encompasses all activities under the jurisdiction of the universities designed to accomplish stated missions and goals." The second one is that "curriculum includes classes, extracurricular activities, and internships. Also, the planning process should involve all who are affected by the program" (Sledge et al., 1987).

The difference found between the "Mission Based" curriculam process and the Competency Based curriculam process is that the latter process not only takes into account the mission and educational goals of the university, but it also involves all who are affected by the program. Based on this criteria, Sledge et al. (1987) identified three areas that affect decisions as the curriculum is planned:

1. institutional parameters;
2. characteristics of agriculture graduates needed for success in 2005; and
3. learner background.

In 1988, FAO prepared a document called, *Formacion de profesionales de ciencias agrarias para una agricultura en crisis.* This document addressed the doubt that the universities preparing professionals in agricultural sciences in Latin America were having about how they were satisfying the needs of professionals that could be effective and useful to society, specifically for rural societies, which were going through a development process. In this document, the authors presented the need for changes in their programs of study, due primarily to a rapidly changing society and the technological and scientific changes that agriculture was going through, specifically in Latin America and the Caribbean (FAO, 1988).

This statement was strongly supported two years later when a change in the educational development strategy in Latin American countries was observed. A radical change was expected in the type of professionals universities should be graduating and the role that these professionals were expected to play in the agricultural sector of Latin America (FAO & ALEAS, 1991).

The document presented by FAO and ALEAS (1991) concluded by presenting a list of attitudes and skills that were needed by future graduates of agricultural sciences in Latin America. The authors of this article stated that there is an urgency for preparing professionals to:

1. have a high consciousness for strengthening small scale agriculture;
2. generate appropriate technology in accordance with the resources available;
3. educate farmers and communities in new technologies and rural administration;

4. design and motivate farmer organizations for a more efficient marketing process, development of local agribusiness, maintenance and recuperation of natural resources that were being degraded;
5. help and contribute to the creation of a more efficient agricultural sector; and
6. create and promote multidisciplinary teams that could help and guarantee the empowerment of the rural sector, encourage the development of commercial and entrepreneurial agriculture, and be able to respond to employers and societal expectations and demands.

Agricultural Education in Latin America

Macias (1990) in his study, "An assessment of agricultural education in Mexico, Central America, and the Caribbean," defined agronomy from the Latin American perspective:

> Agriculture is a social, cultural, and economic process. The scientific study of this process in Latin America is called agronomy. Agronomy is the general umbrella of agricultural sciences which studies and establishes the theory and practice for identifying and applying the principles to solve agricultural problems. (p. 142)

Recent studies have concluded there is a widespread difference between agricultural sciences education offered by institutions of higher education in Latin America and the concrete needs of farmers (FAO & ALEAS, 1991; Macias, 1990). This is particularly true when it comes to the needs of small farmers. In the publication, *Educación agrícola superior en América Latina: Sus problemas y desafíos* (FAO & ALEAS, 1991), it is stated that the

colleges and universities are not meeting national and international needs of companies that hire young professionals graduating in Agronomy.

The FAO and ALEAS (1991) study suggests the job market requires professionals with an educational background that enables them to be entrepreneurs or independent businessmen and women. It is also highly desired that agricultural graduates be qualified to work not only with governmental agencies or institutions but also for private companies. In addition, graduates should possess knowledge that would provide them with the skills necessary to assure effective job performance in agriculture institutions that provide services, as well as those that have to deal with agricultural production, industries, cooperatives, etc. (FAO & ALEAS).

Nagel (1992) stated in his publication, "*Educación de adultos, agricultura y desarrollo rural, los nuevos desafíos,*" that education plays a key role in economic and agricultural development in Latin America. It was Nagel's belief that education must be appropriate to the reality of the working environment. This is critical when designing strategies to help develop rural areas of Latin America.

Based on the fact there was a need for changes in what universities were offering their students, universities in Latin America started to create more universities that would graduate professionals in agricultural sciences instead of analyzing their curriculum. An example of this is the case of Mexico, Chile and Brazil. In an average of 20 years they each had between 63 and 112 new agricultural schools that offer approximately 37 different careers in agriculture (FAO, 1988). The problem with this was that, as FAO and ALEAS (1991) reported, although the numbers of institutions increased, they were not satisfying the real

agricultural needs of farmers, employers or society. The colleges and universities were graduating the same traditional types of agriculture professionals. In other words, the numbers of universities and agricultural trainees had increased but they were not satisfying rural society's changing needs (FAO & ALEAS, 1991).

The Costa Rican history regarding the creation of educational institutions that would prepare professionals in agriculture, indicates that during 1883 the National Agriculture and Mechanics Art School was created. Later on, in 1885 the Agriculture Institute was established. In 1889 the Agricultural National Institute was created, this Institute was going to teach whatever was needed to develop the country's industrial sector. In the following years several schools were established. Some were successful in preparing people to work in agriculture but some did not succeed because of a lack of funds (Guier,1991).

Success in preparing people to work in agriculture became more attainable after 1926 when the first Agriculture National School was created in Costa Rica. This school had the objective of preparing all individuals that would work in agriculture for the country. This institute also attempted to open a section for young people that only completed primary school or two years of high school, however, this plan failed because of a lack of funds. Funds became available for the latter in 1940 when the University of Costa Rica was established. All the resources that had been placed into the Agriculture National School were given to the University of Costa Rica's Agriculture Department (Guier,1991).

Today, Costa Rica has four state-owned universities: Univeridad de Costa Rica (UCR), Instituto Tecnológico de Costa Rica (ITCR), Universidad Nacional)(UNA) and Universidad Estatal a Distancia (UNED). Of these four universities, only three offer degrees

in the agricultural sciences at the Bachelor's and/or Licenciatura level (CRESALC, 1989). There are also two private universities that offer degrees in Animal Science and Agriculture: Escuela Centroamericana de Ganadería (ECAG), and Escuela de Agricultura de la Región Tropical Húmeda (EARTH) (Guier,1991).

Also there are two private institutions that offer a Master's degree in agriculture and agricultural sciences: Centro Agronomico Tropical de Investigación y Enseñanza (CATIE), and the Instituto Centroamericano de Administración de Empresas (INCAE), (CRESALC,1989).

Costa Rica's higher educational system offers more than 17 different career opportunities in agriculture, the agricultural sciences and related areas. These opportunities range from a three year degree to a Masters degree. According to CONARE (1993), there has not been any analysis of the technical skills needs of an Agriculturalist in Costa Rica for over 10 years.

Research Questions

The following research questions were developed based upon the literature review:

1. What are the primary technical skills an agriculturist should possess?
2. What are the principal areas of knowledge an agriculturist should possess?
3. What knowledge and skills are perceived as important when considering the changes facing the agriculture sector in Costa Rica?
4. What specialty areas in agriculture are foreseen as important for future graduates?
5. What are past and future employment trends?

6. Aside from academic preparation, what are other characteristics which are considered when hiring agriculturalists?

CHAPTER III. DESIGN AND PROCEDURES OF THE STUDY

The main purpose of this study was to determine the knowledge and skills needed by agriculturalists as perceived by potential employers in agriculturally related businesses, governmental and non-governmental agencies as well as the international development sector in Costa Rica. A secondary purpose of the study was to identify specific knowledge and skills that potential employers desire graduates to possess and to make this information available to the EARTH College for its curriculum review process. An additional purpose was to develop a valid and reliable instrument which may serve as the basis for further research in other countries represented by the EARTH College student population.

Based upon the perceptions of individuals who were defined as potential employers of *Ingeniero Agronomos* with the title of *Licenciatura* or the term agriculturalists which has been defined to be the same for the purposes of this study, the objectives of the study were to: (1) Identify technical skills required for employment in the agricultural sector; (2) Identify knowledge required for employment in the agricultural sector; (3) Identify specific information regarding skills and knowledge needed by EARTH graduates that may be utilized in EARTH's on-going general curriculum review process; (4) Gather information which will help identify senior year elective courses; and (5) Determine and verify the instrument validity in order to provide a research instrument which may be used to replicate this study in other countries in Latin America from which EARTH College has students represented. Field research for this study was carried out between October, 1994 and February, 1995, during the time the author was working at EARTH College in Costa Rica.

Research Questions

The following research questions were addressed in this study, focusing on the perceptions of potential employers of agriculturalists in the agricultural sector in Costa Rica.

1. What are the primary technical skills an agriculturalist should possess?
2. What are the principal areas of knowledge an agriculturalist should possess?
3. What knowledge and skills are perceived as important when considering the changes facing the agriculture sector in Costa Rica?
4. What specialty areas in agriculture are foreseen as important for future graduates?
5. What are past and future trends of the company?
6. Aside from academic preparation, what other characteristics are considered when hiring an agriculturalist in Costa Rica?

Population of the Study

For the purposes of this study, only those entities that were active in the agricultural sector in Costa Rica, and that were potential employers of agriculturalists, were considered to be members of the research population. Since a comprehensive list of all potential employers of agriculturalists in Costa Rica was not available, it was necessary to obtain this information by consulting a variety of sources. These sources included the EARTH internship and job placement data-base, the files of the External Relations Office at the College, the National Association of *Ingenieros Agronomos*, the National Association of Agro-Chemical Companies and a variety of other associations and individuals. In particular, since Costa Rica has such diversified agriculture, farmers have created different associations according to what

they produce. These associations were requested to send a list of companies and individuals that could be considered potential employers of agriculturalists; however after repeated requests, it was not possible to obtain this information.

The author was able to compile information and create a data-base of all the companies that were potential employers of agriculturalists in Costa Rica by using the sources cited above, individual interviews, and by reviewing the country's telephone book in which companies were listed. A complete list of the members of the research population may be found in Appendix C. The list includes all businesses, governmental and non-governmental institutions, and organizations of the international development sector working in agriculture that were identified by using the above stated methodology.

Initially, 160 entities related to the agricultural sector were identified. Telephone calls were made to assure that the organizations selected were potential employers of agriculturalists. Of the 160 entities selected, 11 were determined to be inappropriate for inclusion in the study based on one of the following two criteria:

1. The entity did not or would not have the need to hire an agriculturalist;
2. The entity did not have an address or telephone where it could be contacted.

Five entities originally identified as potential members of the population were excluded on the basis of criteria one and six were excluded on the basis of criteria two. A final group of 149 entities were identified to be members of the research population.

Two questionnaires were sent to each entity which was defined as a member of the population. In each entity an administrator and a technical person were requested to

complete the questionnaire. A summary of the population, questionnaires distributed and return rate is shown in Table 3.

It was possible to identify an individual at the administrative level in each of the entities identified as potential employers of agriculturalists. As such, the respondents were divided into the following two categories: (1) administrators and (2) technicians. Of the 148 respondents 74 or 50%, were administrators and 74, or 50%, were technicians answering the questionnaires (Table 4).

Table 3. Research population questionnaires distributed and return rate

Research population	Number	Percent
Entities initially identified	160	
Entities excluded based on criteria one	5	
Entities excluded based on criteria two	6	
Total population	149	
Questionnaires distributed	298	
Questionnaires answered and returned	148	
Questionnaires not returned or returned unanswered	150	
Return ratio		49.5
Non-return ratio		50.5

Table 4. Respondents' return rate according to their job responsibilities and type of entity they represented

Type of entity	Administrators	Technicians
Private	56	54
Governmental	12	10
International	8	8
Total	76	72

Research Design

A review of related literature was conducted, and it revealed no other instrument appropriate for use in this study. In an effort to identify if other studies similar to this one had been conducted in Costa Rica a visit was made to the National Council of Costa Rica's University Deans (CONARE). In a personal interview, CONARE officials indicated they were not aware of any study of this kind in the area of agriculture. A subsequent search by CONARE of different universities in the country also indicated there was no record of such a study (personal interview, 1994).

During the curriculum review process at EARTH College (January 1994), it was proposed that an evaluation of the actual curriculum should be conducted. A research study entitled College Data on Agricultural Training in Central America, was utilized to assess the need for the creation of an institution such as the EARTH College which would have its focus on sustainable agriculture in the humid tropics. It was recommended that similar research be conducted during 1994 or 1995.

For this study it was determined descriptive research methodology using a questionnaire as the research instrument for data collection was appropriate. Based upon the knowledge of what subjects are taught in agricultural colleges or universities in Costa Rica and upon the goals and objectives of this research study, the following six areas of specialization in agriculture were included: (a) Agriculture; (b) Animal Science; (c) Soil and Water Conservation; (d) Entrepreneurial Management; (e) Communication; and (f) English.

The initial questionnaire was developed by the researcher in Spanish (Appendix D) and later translated into English to be available to a wider audience. However, it must be

noted that the English version is not preferred as the instrument was designed specifically for use in Costa Rica by Spanish-speaking persons who participated in the present study. Results of a future study conducted using the English version may not validate the original instrument. The translation may not be exactly pure. The instrument focused on the basic skills and competencies the author considered were needed by a graduate in agriculture in relation to the six areas of specialization mentioned above. The first draft of the questionnaire was presented to specialists (faculty at EARTH and UCR) in each of the six areas of specialization. Each specialist reviewed the entire questionnaire, paying special attention to those sections that pertained to his/her area of expertise. The comments and suggestions that were made by these experts provided the grounds for improvement of the quality and content of the questionnaire. The revised version of the questionnaire was presented to the Academic Director of the EARTH College who made other corrections and suggestions to the content and format of the questionnaire.

The questionnaire's content validity was initially tested by faculty members at EARTH College for both clarity of the language used as well as for subject matter content. It is important to note that each faculty who reviewed and answered the questionnarie had an in-depth knowledge of the agriculture sector in Costa Rica.

The instrument was tested additionally with a second group of agricultural professionals who were participating in a program entitled "Longterm Training in Environmental Protection for Bolivian Environmental Planners" at Iowa State University. This second testing was solely for the purpose of verifying the process by which the researcher planned to manage the data, including coding of the data and statistical analysis.

The content of the questionnaire was not modified based upon the input given by the Bolivians. This second test was performed during a trip to Ames, Iowa, during September of 1994. The final version of the questionnaire was approved by the major professor and graduate committee in charge of this graduate program.

The questionaire was divided into three sections. The first section asked the respondents to rank technical activities related to his or her area of operation, from least important to most important. The second consisted of Likert-type questions, developed to identify the perceptions of respondents as stated in the research objectives. The third section was designed to gather information that would describe the agricultural entity represented by the respondents, and to gather data that would describe each member of the research population.

The questionaire was translated into English by the researcher (Appendix E). This questionaire and the corresponding research proposal was submitted to the Iowa State University Committee on the Use of Human Subjects in Research, which approved the research instrument and methodology (Appendix F).

The data were analyzed statistically using means, standard deviations, and percentages. The statistical program SPSSx was used to conduct the data analysis.

Data Collection

The respondents were individuals employed in the entities determined to be members of the research population, as defined by the previously mentioned criteria. Two questionnaires were sent to each entity that were determined to be part of the research

population. Taking into consideration the traditionally low return rate of research questionnaires in Latin America, and in order to assure an adequate sample size, it was decided to survey 100% of the entities which made up the research population. This methodology proved successful in a similar international research study conducted in Peru (Brown Mejia, 1991).

The instrument was sent by the end of October and beginning of November 1994. A package was sent to the administrator of each organization included in the study. A cover letter was included, this letter was signed by the researcher and by the general director of EARTH College. The cover letter explained clearly that one questionnaire should be completed by an administrator and the other one by a technician working in the area of agriculture or to forward both questionnaires on to such individuals. Each package which was mailed contained two questionnaires, one on yellow paper for administrators and the other one on blue paper for technical personnel. Two pre-stamped, return envelopes were included. The use of different colors enabled the researchers to quickly identify the respondents within an entity.

The Costa Rican public mail is very reliable and, as such, was used to deliver the packets. Two weeks later each contact person at each entity was telephoned and asked to confirm if the questionnaire had been received. It was asked if the questionnaire had been completed and returned. At the end of the third week, if the questionnaire had not been received by the researcher, a postcard was sent as a second reminder. During week five, a second telephone call was made to a contact person at each entity which had not yet returned

the questionnaire. One week later, another postcard was mailed to all who had not yet responded. By the thirteenth of December, week seven, the return rate was only 23.66%.

After the fifteenth of December all public and private institutions in Costa Rica either close or greatly slow down their activities. Key personnel take holiday vacations and there are virtually no employees working over the end of year holidays in these organizations. This issue affected the data return. The researcher began to contact the entities that had not responded in January to continue the data collection. During the first week of January, the telephone call and postcard procedure was repeated until: (a) both completed instruments were returned; (b) one completed instrument was returned and the second one was returned blank; (c) both instruments were returned blank; or (d) it was indicated via telephone or mail that either instrument would not be completed or sent and they would state the reason for their decision; or (e) a reason was given that indicated that there was no willingness to return the questionnaire. Questionnaires were received until the beginning of July, 1995.

Analysis of Data

The data were coded and subsequently analyzed using the Statistical Package for the Social Sciences (SPSSx) at the facilities of the EARTH College. All questionnaires were reviewed for coding and accuracy. Descriptive statistics were calculated using SPSSx program FREQUENCIES. This procedure provides the respective frequencies, standard deviations, percentages and means that were used to provide this study with a descriptive overview of the data.

Limitations of the Study

EARTH College currently has students from over 20 countries from throughout Latin America and the Caribbean regions. This study focused exclusively on Costa Rica and did not specifically take into consideration other countries' needs and perceptions. It must be noted that many multinational corporations in agriculture have their regional headquarters in San Jose, Costa Rica, and often conduct hiring procedures from this central point.

A national study of this kind had not been conducted by any of the institutions of higher education or other related institutions in the last 10 years that focused on the market for graduates as agriculturalists. Therefore, the researcher was unable to compare findings with similar studies in Costa Rica.

There is no official record of how many agriculturalists there are in Costa Rica. The only records that exist are those that show those individuals who are members of *Colegio de Ingenieros Agronomos*, the leading professional association for agriculturalists.

An additional limitation to this study was the relatively low return rate by United States standards. While it would have been desirable to have acheived a greater return rate, 49.5% may be considered to be well within the expected range by Latin American Standards.

CHAPTER IV. PRESENTATION AND ANALYSIS OF DATA

The results and the analysis of data are presented in this chapter. The main purpose of this study was to determine the knowledge and skills needed by agriculturalists as perceived by potential employers in agriculturally related businesses, governmental and non-governmental agencies as well as the international development sector in Costa Rica. A secondary purpose of the study was to identify specific knowledge and skills that potential employers desire graduates to possess. An additional purpose was to develop a valid and reliable instrument that could serve as the basis for further research in other countries represented by the EARTH College student population.

Based upon the perceptions of individuals who were defined as potential employers of agricultural graduates, the objectives of the study were to:

1. Identify technical skills required for employment in the agricultural sector;
2. Identify knowledge required for employment in the agricultural sector;
3. Identify specific information regarding skills and knowledge needed by EARTH graduates that could be used in EARTH's on-going general curriculum review process;
4. Gather information that would help identify senior year elective courses; and
5. Determine and verify the instrument validity in order to replicate this study in other countries in Latin America from which EARTH College has students represented.

Field research for this study was carried out between October, 1994, and February, 1995, during which time the author was working at the EARTH College in Costa Rica.

The data presented in this chapter are divided into the following sections: (1) the demographic characteristics of the respondents; and (2) a descriptive profile of the institutions of the population.

Demographic Characteristics of the Respondents

The demographics were analyzed based on the following eight characteristics: (a) gender; (b) age; (c) nationality; (d) educational level; (e) area of specialization of highest degree earned; (f) country in which highest degree was earned; (g) years of experience working for the agricultural entity; and (h) job responsibilities.

Gender

The distribution of respondents by the variable of gender is shown in Figure 1. Of the 148 usable questionnaires, 132 (89.9%) of the respondents were male, 13 (8.8%) were female, 2 respondents (1.4%) did not answer this question.

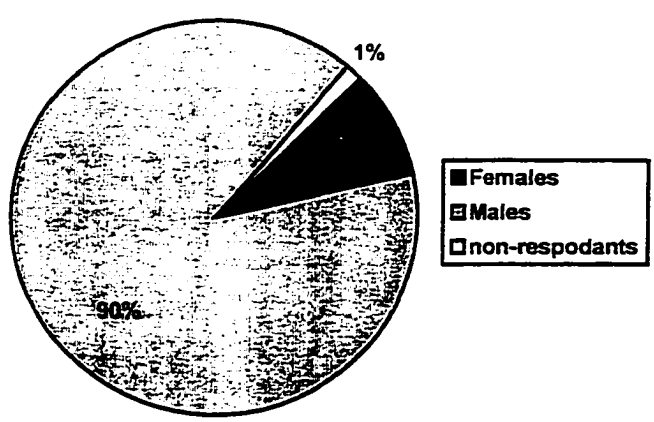


Figure 1. Distribution of potential employers of agriculturalists in Costa Rica by gender (N=148)

Age

Respondents were asked to state their age. For the purpose of data analysis and presentation, this information was grouped into six categories: (a) 25 years of age and below; (b) 26 to 30; (c) 31 to 35; (d) 36 to 40; (e) 41 to 45; and (f) 46 and above.

A total of 3 (2.0%) respondents were 25 years and below; 20 (13.5%) were between ages 26 to 30; 35 (23.6%) were between ages 31 to 35; 31 (20.9%) were 36 to 40; 29 (19.6%) were between ages 41 to 45; 28 (18.9%) were ages 46 and above, and 2(1.4%) did not answer the question. The data regarding age may be found in Figure 2.

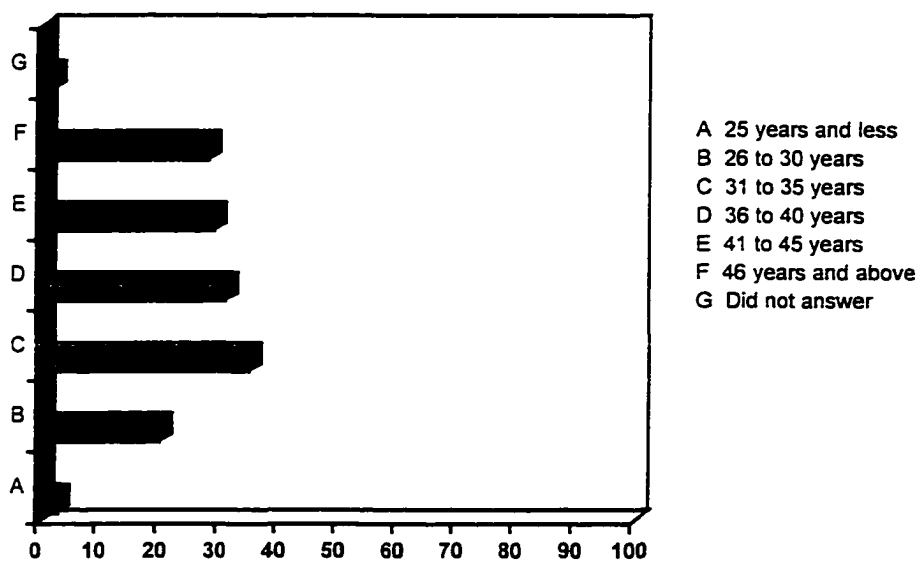


Figure 2. Distribution of potential employers of agriculturalists in Costa Rica by selected age groups (N=148)

Nationality

The members of the population were from a total of 10 different countries, with 132 respondents (89.2%) from Costa Rica and 11 (7.7%) from countries other than Costa Rica. Table 5 shows detailed information concerning respondents' nationality.

Educational level

Respondents were asked to identify their highest level of education attained using categories established by the researcher. The respondents' educational level by category was as follows: high school degree = 3 (2.0%); technical school degree = 8 (5.4%); bachelor's degree = 50 (33.8%); *Licenciatura* degree = 50 (33.8%); master's degree = 29 (19.6%); 4 had Ph.D. degrees and 4 did not answer the question. One hundred thirty-three (90%) were

Table 5. Nationality of potential employers of agriculturalists in Costa Rica by number and percent

Nationality	Number	Percent
Costa Rican	132	89.2
Venezuelan	3	2.0
Columbian	1	0.7
Mexican	1	0.7
Argentinean	1	0.7
Holland	1	0.7
Swiss	1	0.7
Danish	1	0.7
Dominican Republic	1	0.7
Honduran	1	0.7
Non respondents	5	3.4
Total	148	100.0

university graduates with either a bachelors *Licenciatura,* Master's degrees or Ph.D. degrees. Data from the respondents are represented in Figure 3.

Area of specialization of highest degree earned

Table 6 presents a list of the different subject matter areas of specialization for the highest degree earned by the respondents. There was much diversity in the respondents' academic background. Nearly half (46.4%) were in agronomy and agricultural engineering or economics, while the next largest area of specialization was administration (23.6%).

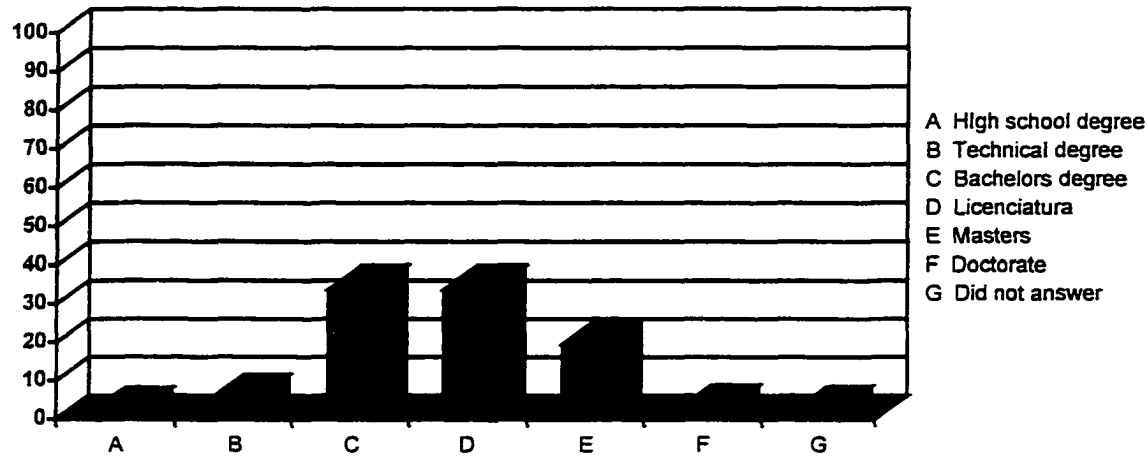


Figure 3. Highest level of education attained by potential employers of agriculturalists in Costa Rica (N=148)

Country in which highest degree was earned

Of the total population (N= 148), the majority of the respondents or 107 (72.3%) respondents earned their highest academic degree in Costa Rica. The second country from which respondents earned their highest academic degree was the United States of America

Table 6. Subject matter area of the highest degree earned by potential employers of agriculturalists in Costa Rica by number and percent

Degree area	Frequency	Percentage
Agronomy	39	25.4
Agricultural Engineering	15	11.5
Agricultural Economics	14	9.5
Administration	35	23.6
Biology	7	4.8
Social Sciences	6	4.2
Animal Husbandry	5	3.4
Forestry Industry	2	1.4
Exterior Commerce Engineer	2	1.4
Industrial Chemistry	1	0.7
Civil Engineering	1	0.7
Ecology	1	0.7
Not indicated	16	10.8
Total		100.0

representing17 (11.5%) respondents. Nineteen respondents (13.2%) obtained their highest academic degree in a country other than Costa Rica or the U.S.A. (Table 7). A total of 5 respondents (3.4%) did not answer the question.

Years of experience working for the agricultural entity

Respondents were asked to identify the number of years they had worked for the agricultural entity they represented. To facilitate analysis and presentation, the data was grouped into the following categories of years working with the agricultural entity: (a) less than 6 years; (b) 6 to 10 years; (c) 11 to 15 years; (d) 16 to 20 years; (e) 21 to 25 years; (f) 26

Table 7. Frequencies and percentages of country in which highest degree was earned by potential employers of agriculturalists in Costa Rica

Country	Frequency	Percent
Costa Rica	106	71.6
United States of America	17	11.5
Honduras	6	4.1
Columbia	2	0.7
El Salvador	1	0.7
Japan	1	0.7
Guatemala	1	0.7
Trinidad	1	0.7
Italy	1	0.7
Mexico	1	0.7
Venezuela	1	0.7
Puerto Rico	1	0.7
Switzerland	1	0.7
Brazil	1	0.7
Denmark	1	0.7
Did not answer	6	4.1
Total	148	100.0

to 30 years; and (g) 31 years or above. A total of 68 (45.9%) respondents had less than 6 years of experience with their agricultural entity; 39(26.4%) had 6 to 10 years of experience; 22(14.9%) had 11 to 15 years of experience at that entity; 12(8.1%) had 16 to 20 years; 2(1.4%) had 21 to 25 years; 4 (2.7%) had 26 to 30 years; 1(0.7%) identified himself/herself as having more than 30 years of experience working at an agricultural entity. The data are presented in Figure 4.

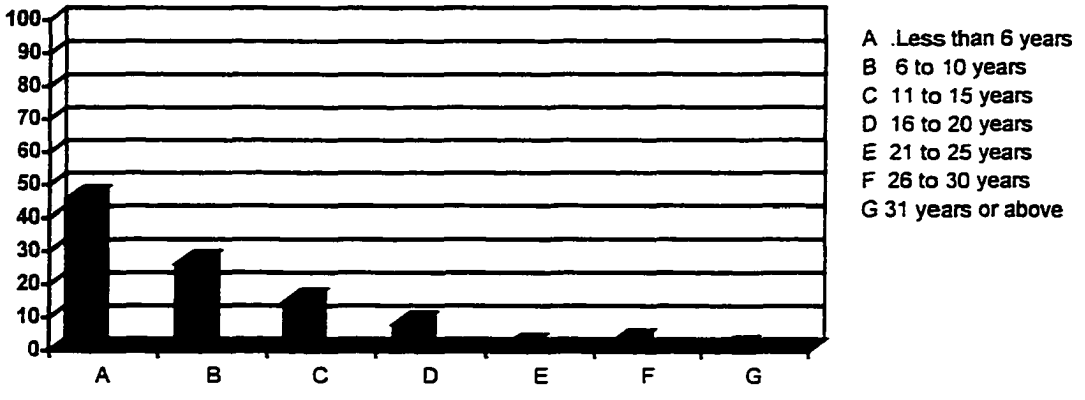


Figure 4. Number of years respondents had worked for an agricultural entity

Job responsibilities

Respondents were asked to select among three different job responsibilities which were pre-established by the researcher based on the methodology cited in Chapter 3. The areas pre-established were administrative area = 45 respondents (30.4%); technical area = 27 (18.2); combined responsibilities (administrative with technical) = 71 (48%); work performance evaluator = 1 (.7); and planner = 1 (.7). Of the total research population, 3 respondents (2.0%) did not answer this question. A summary of the job responsibilities held by the respondents is presented in Figure 5.

Description of Entities in the Research Population

Five factors were considered in compiling a description of entities in the research population: (a) definitions of institutions; (b) principal operation of the entities; (c) activities; (d) number of years the entity had been active in agriculture; and (e) size of the organization.

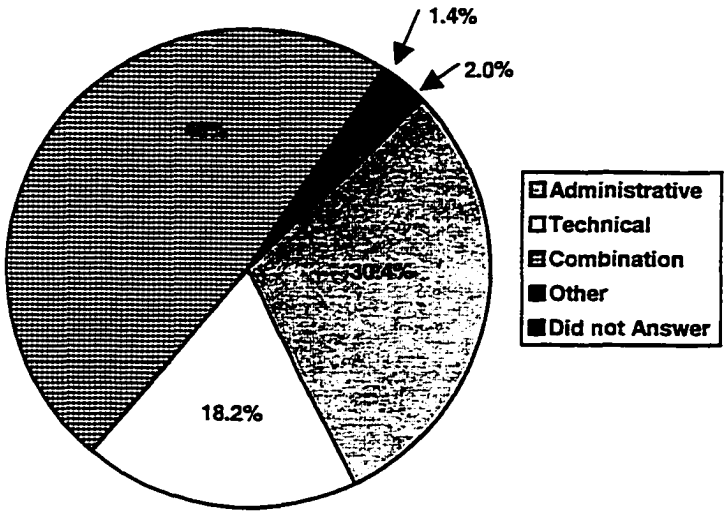


Figure 5. Job responsibilities held by the potential employers of agriculturalists in Costa Rica

Definitions of the institutions

Respondents were asked to identify the entities of which they were a member based on one of the following categories: (1)private (belonging to the private sector); (2) governmental (belonging to the governmental sector); or (3) international (belonging to the international sector). For the purpose of this study, those identifying themselves as semi-autonomous (n=2) were considered to be members of the governmental sector. Those identifying themselves to be a part of non-governmental organizations (n=5) or bi-national projects (n=1) were considered to be part of the international sector. Additionally, entities identifying themselves as cooperatives (n=3), civic societies (n=2), or associations (n=2) were considered to be part of the private sector for the purpose of the study. A total of 108 (73%) respondents defined their place of employment as belonging to the private sector, 24

(16.2%) as part of the governmental sector, 15 (10.1%) as part of the international sector, and 1 (.7%) did not answer the question. The data are presented in Figure 6.

Principal operation of the entities

Respondents identified the principal operation of the entity by whom they were employed as belonging to one of the following eight categories pre-established by the researcher: (1) production = 54 (36.5%); (2) marketing and distribution = 40 (20%); (3) credit and financial activities = 7 (4.7%); (4) food processing = 7 (4.7%); (5) sales, repair and distribution of agricultural equipment = 5 (3.4%); (6) research = 10 (6.7%); (7) agricultural and community development = 8 (5.4%); and (8) education = 1 (.7%). The question allowed for the respondents to give an additional activity with which their organization was involved. The respondents identified 5 additional areas that were not established by the researcher, as

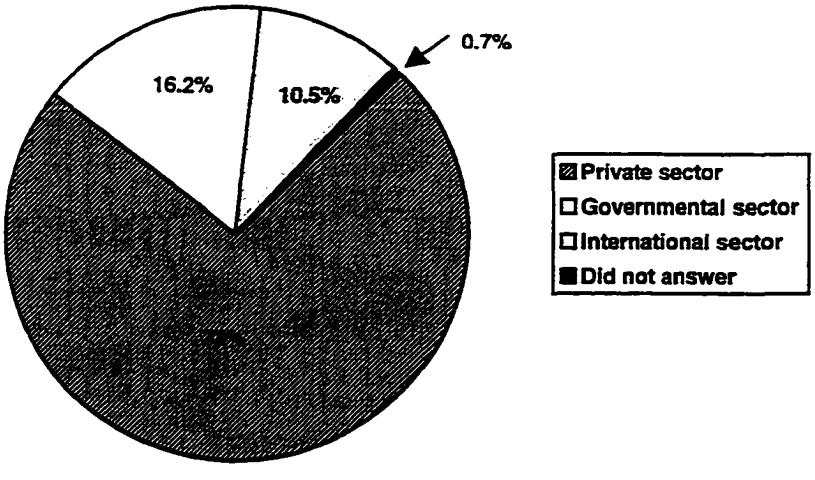


Figure 6. Definitions of institutions that are potential employers of agriculturalists in Costa Rica

follows: (1) forestry development = 3 (2%); (2) conservation = 2 (1.4%); (3) seed production = 2 (1.4%); (4) production and processing = 5 (3.4%); and (5) multi-services = 3 (2%). All data provided by the respondents are presented graphically in Figure 7.

Activities

Members of the population were asked to identify the activities that were undertaken by the entities they represented. A list of 12 potential activities were provided by the researcher from which the respondents could select those appropriate for their entities. It was anticipated that the entities would undertake more than one activity, therefore the categories provided were not mutually exclusive.

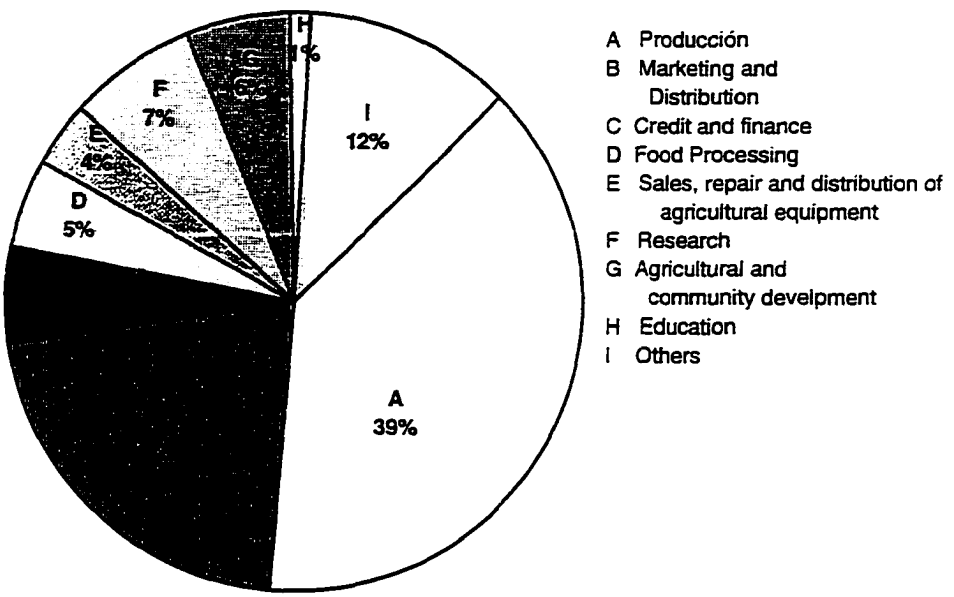


Figure 7. Principal operation of the entities that are potential employers of agriculturalists in Costa Rica

In addition, it was anticipated that there would be entities that would provide other alternatives different than the ones provided by the researcher. Table 8 presents the information provided by the respondents based upon the list of potential activities outlined by the researcher. Data are provided in Table 9 for the list of additional activities identified by the members of the population.

Number of years the entity had been active in agriculture

In regards to the number of years the entity had been active in the agricultural sector, the data were collected in raw form and placed into the following categories by the researcher to facilitate analysis and presentation: (a) less than 20 years = 80 (54%); (b) 21 to 30 years =

Table 8. List of potential activities and their frequencies which were identified by potential employers of agriculturalists

Activity	Frequency
Agricultural production	91
Technical assistance	65
Exports of agricultural products	55
Training and education	40
Agricultural Products	37
Food Processing	35
Horticulture production	29
Credit and financial matters	26
Animal production	25
Agricultural equipment (sales - repair)	23
Ornamentals	18
Flower production	12

Table 9. List of other activities identified by employers of agriculturalists in Costa Rica

Activity	Frequency
Preparing animal feed	5
Seed production	3
Conservation	3
Banana production	2
Agricultural diversification	2
Marketing information	2
Forestry	2
Credit for small scale industry	2
Irrigation and drainage	2
Micro nutrients sales	1
Sales (grocery stores)	1

20 (13.5%); (c) 31 to 40 years = 9 (6.1%); (d) 41 to 50 years = 9 (6.1%); and (e) 51 years or more = 15 (10.3%). Fifteen respondents did not answer this question. The number of years the entity had been active in the agricultural area at the time of data collection is presented in Figure 8.

Size of the organizations

In order to determine the size of the entities that comprised the research population, the respondents were asked to provide information regarding the number of people working where they were employed. Raw data were collected and placed into categories by the researcher to facilitate the analysis and presentation. The categories and amounts are as

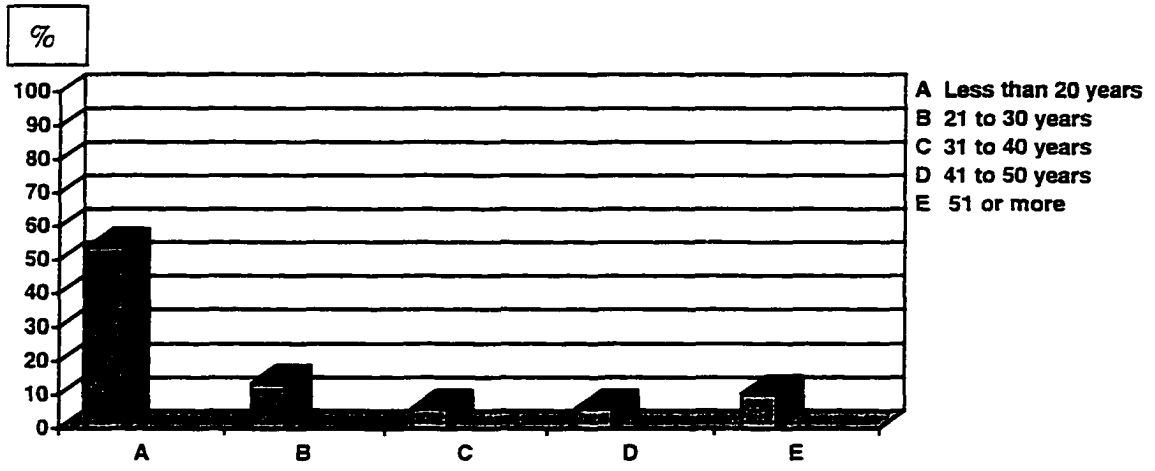


Figure 8. Percentage of companies/entities and number of years the entity has been active in agriculture (N=133)

follows: (a) less than 25 persons = 57 (38.5%); (b) 26 to 50 employees = 18 (12.2%); (c) 51 to 75 employees = 2 (1.4%); (d) 76 to 100 employees = 7 (4.7%); and (e) more than 100 = 53 (35%). Eleven respondents did not answer the question (7.4%). Data are represented in Figure 9.

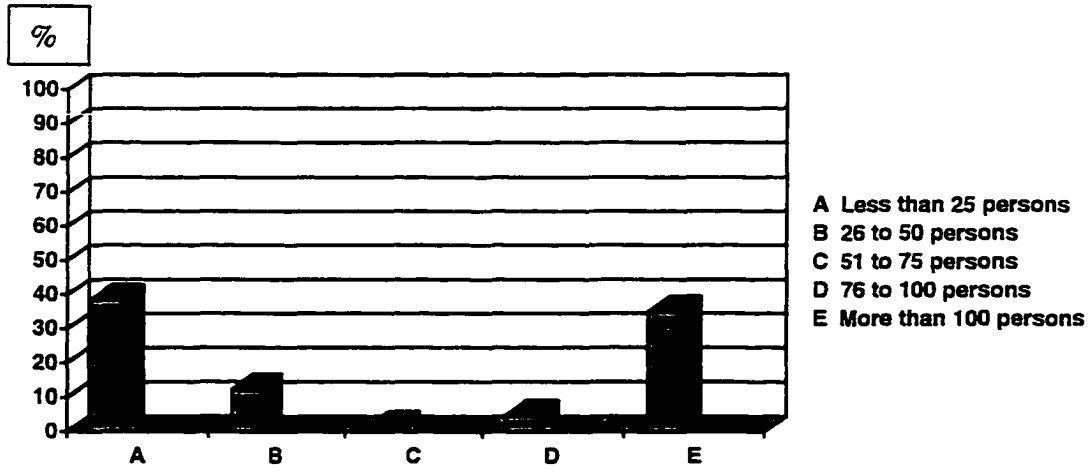


Figure 9. Percentage of organizations/entities by size

Perceptions of the Respondents Regarding the Importance of Technical Activities

Respondents were asked to rate activities they perceived as important based on a seven point Likert-type scale from 1 to 7, with 7 being "high priority" and 1 "low priority". This information was based upon the activities undertaken by the entity for which they were employed. A list of activities was provided by the researcher from which 97 (65%) of the respondents rated agricultural production as 7 or being high priority. Post-harvest activities were rated by 65 (43.9%) of the respondents as being number 5. Food processing was rated as 4 by 23 (15.5%) respondents. Natural resource management was rated as 3 by 45 (30%) respondents. Agricultural engineering and mechanization was rated as 3 by 31 (20.9%) respondents, with forestry being rated as 2 by 32 respondents (21.6%). Lastly, animal production was rated as 1 by 65 (43.9%) of the respondents. Perceptions of respondents regarding the importance of activities conducted by these agencies are summarized in Table 10.

Table 10. Importance of technical activities as perceived by potential employers of agriculturalists in Costa Rica (N=148)

Activity	Priority rating*	n	Percent
Agricultural production (plant production)	7	97	65.5
Animal production	1	65	43.9
Forestry	2	32	21.6
Natural resource management	3	45	30.0
Agricultural engineering and mechanization	3	31	20.9
Post-harvest	5	29	19.6
Food processing	4	23	15.5

*Scale: 7 = most important priority; 1 = not important priority (multiple responses)

Using a Likert-type scale of 1 to 7, with 7 being a "high priority" and 1 "not a priority" and based upon the nature of the work conducted by the entity, the respondents were asked to rate technical and practical skills. It was indicated the rating should be based upon their perceptions in their role as potential employers of agriculturalists. A list of technical and practical skills was established by the researcher. The scale respondents used to rate the activities was from 1 (low priority) to 7 (high priority). The respondents considered that an agriculturalist should be able to: work with management skills appropriate to the entity; perform skills needed to work in the field; demonstrate good interpersonal skills; demonstrate good communication skills; and disseminate information. The use of computers, quantitative information and scientific information were considered to be moderately important and were rated with a 5. The respondents considered the lowest priority when hiring an agriculturalist was the use and knowledge of sustainable agriculture related issues. These data are summarized and presented in Table 11.

Table 11. Importance of technical and practical skills as perceived by potential employers of agriculturalists in Costa Rica (N=148)

Technical/Practical skills	Priority rating*	n	Percent
Managerial skills	7	72	48.6
Field work skills	7	47	31.8
Interpersonal skills	7	36	24.3
Communication skills	7	48	32.4
Dissemination of information	7	38	25.7
Use of computers; use of quantitative and scientific information	5	49	33.1
Use and knowledge of sustainable practices	1	29	19.6

*Scale: 7 = most important priority; 1 = not important priority

Perceptions of Specific Skills Needed for Employment of Agriculturalists in Costa Rica

The following section is based upon the specific objectives of this study: (1) Identify technical skills required for employment in the agricultural sector; (2) Identify knowledge required for employment in the agricultural sector; and (3) Identify specific information regarding skills and knowledge needed by EARTH gradates that may be used in the College on-going general curriculum review process, as perceived by the members of the research population who were defined as potential employers of agriculturalists in Costa Rica. All answers were based upon a five point Likert-type scale, with 5 being "very important" and 1 "not important".

Data in Table 12 present the respondents' perceptions of the importance of different topics in the area of animal production skills for agriculturalists. The results indicate that the respondents do not perceive animal production as a very important skill agriculturalists should possess.

Table 12. Importance of animal production skills as perceived by employers of agriculturalists in Costa Rica (N=148)

Specific knowledge area	Valid cases	Mean*	S.D.
Cattle for meat	142	2.73	1.64
Cattle for milk	142	2.78	1.61
Cattle for meat and milk	142	2.70	1.61
Hogs	139	2.34	1.51
Goats	138	1.77	1.17
Sheep	137	1.67	1.11
Poultry	142	2.32	1.54
Crustaceans	141	1.82	1.26
Fish	140	1.95	1.38

*Scale: 5 = very important; 1 = not important

Respondents were asked to rate the importance of agriculturalists possessing skills in traditional and non-traditional crop production. The definitions of traditional and non-traditional crops are given in the definitions section of this document. Responses revealed that respondents perceive as somewhat important that agriculturalists possess skills in traditional and non-traditional crops. Medicinal plants, however, were perceived to be less important than the other categories in this section. Table 13 presents the data regarding this subject.

Table 13. Importance of knowledge regarding traditional and non-traditional crops as perceived by employers of agriculturalists in Costa Rica (N=148)

Specific knowledge area	Valid cases	Mean*	S.D.
Traditional crops			
a. Grains	141	3.52	1.53
b. Horticulture	144	3.41	1.48
c. Medicinal plants	143	2.41	1.27
d. Roots and tubers	140	3.14	1.39
e. Fruits	143	3.59	1.42
f. Ornamental plants	145	3.17	1.48
g. Industrial crops	141	3.28	1.49
Non-traditional cops			
a. Grains	140	3.16	1.48
b. Horticulture	142	3.27	1.49
c. Medicinal plants	140	2.48	1.36
d. Roots and tubers	138	3.13	1.44
e. Fruits	142	3.47	1.46
f. Ornamental plants	139	3.19	1.52
g. Industrial crops	129	3.26	1.54

*Scale: 5 = very important; 1 = not important

Table 14 shows the perceptions of the respondents when asked to indicate the level of importance they believed forestry production occupies in Costa Rica. Respondents indicated management of forestry plantations and forestry greenhouse management was considered somewhat important. Knowledge regarding the managing of native forest was considered to be as less important.

Table 14. Means and standard deviations for ratings regarding the importance of having skills in management of forestry plantations as perceived by employers of agriculturalists in Costa Rica (N=148)

Specific knowledge area	Valid cases	Mean*	S.D.
Management of native plantations	144	2.92	1.50
Management of forestry plantations	143	3.07	1.49
Management of forestry greenhouses	144	3.01	1.46

*Scale: 5 = very important; 1 = not important

Another area that was considered in this research study was Natural Resource Management. Respondents were asked to give their perceptions on this subject. The members of the research population considered the development of soil conservation practices to be important ($x = 4.14$; S.D. = 1.28). Other areas that were perceived as somewhat important were: (1) planning skills regarding the potential use of the natural resources ($x = 3.75$; S.D. = 1.28); (2) decision making abilities with regard to waste management ($x = 3.89$; S.D. 1.26); and (3) ability to conduct environmental impact ($x = 3.72$; S.D. = 1.36). The ability to develop ecotourism activities was considered to be of less importance ($x = 2.63$; S.D. = 1.39). Table 15 presents the data regarding this issue.

Table 15. Means and standard deviations for ratings regarding the importance of natural resource management skills as perceived by employers of agriculturalists in Costa Rica (N=148)

Specific knowledge	Valid cases	Mean*	S.D.
Planning for potential use	142	3.75	1.28
Decision making regarding its management	145	3.89	1.26
Developing ecotourism activities	144	2.53	1.39
Developing conservation techniques	146	4.14	1.28
Developing studies on environmental impact	145	3.72	1.36

*Scale: 5 = very important; 1 = not important

Table 16 presents the perceptions of potential employers of agriculturalists in Costa Rica regarding the importance of knowledge in: (1) rural construction; (2) water and soil management; (3) agricultural mechanization; and (4) topography. The area that was considered most important was the area of water and soil management (x = 4.26, S.D. = 1.06).

Sustainability issues such as being able to produce using techniques that would reduce contamination, using organic fertilizers, avoiding the use of agro-chemicals, and producing organically were included on the questionnaire. The respondents considered the

Table 16. Means and standard deviations for ratings regarding the importance of agricultural engineering and mechanization skills as perceived by employers of agriculturalists in Costa Rica (N=148)

Specific knowledge area	Valid cases	Mean*	S.D.
Rural construction	140	3.04	1.28
Water and soil management	147	4.26	1.06
Agricultural mechanization	144	3.59	1.25
Topography	144	3.42	1.33

*Scale: 5 = very important; 1 = not important

most important area for agriculturalists to have expertise in this category was that related to production while using technology that would reduce contamination. Other areas such as production and use of organic fertilizers, and production without using chemical products were considered by the respondents to be somewhat important. Table 17 presents the respondents' perceptions in this regard.

Regarding the area of post-harvest management, the respondents' considered the most important skill to have is the ability to develop systems in which they could reduce loss of products during the process of handling and transporting the harvested products. Table 18 shows the data related to this question.

Table 17. Means and standard deviations for ratings regarding the importance of skills related to sustainability issues as perceived by employers of agriculturalists in Costa Rica (N=148)

Specific knowledge	Valid cases	Mean*	S.D.
Production while reducing contamination	146	3.42	1.00
Production using organic fertilizers	144	3.90	1.18
Production without commercial pesticides	143	3.66	1.34

*Scale: 5 = very important; 1 = not important

Table 18. Means and standard deviations for ratings regarding the importance of having post-harvest management skills as perceived by employers of agriculturalists in Costa Rica (N=148)

Specific knowledge	Valid cases	Mean*	S.D.
Development of adequate packing systems	148	3.47	1.32
Development of adequate storing systems	148	3.61	1.34
Identification of adequate handling and transportation systems	147	4.02	1.21

*Scale: 5 = very important; 1 = not important

Food processing was considered by the respondents to be an area of moderate importance. The members of the research population considered the ability to analyze the added value of processing the products (x=3.41, S.D.= 1.38), and to be able to identify alternative uses for the products (x=3.46, S.D.= 1.34) to be somewhat important. The actual processing of the products was considered to be less important (x=2.96, S.D.= 1.39). Table 19 presents the data in this category.

Table 19. Means and standard deviations for ratings regarding the importance of having food processing skills as perceived by employers of agriculturalists in Costa Rica (N=148)

Specific knowledge	Valid cases	Mean*	S.D.
Analyzing the added value of processing products	147	3.41	1.38
Identifying alternative uses for products	147	3.46	1.34
Processing products	147	2.96	1.39

*Scale: 5 = very important; 1 = not important

Another area that was presented to the members of the research population for consideration was that of management skills in business administration. For this broad topic, several aspects were presented to the respondents for rating. The aspects considered to be the most important were the ability to think and behave as a manager, to be able to manage and control a budget, and to apply Total Quality Management skills. Table 20 presents the data regarding this area.

Respondents were asked to rate their perceptions regarding the importance of possessing skills in field-related activities. The three areas considered to be important by the respondents were: (1) management of soils and water and conservation practices

Table 20. Means and standard deviations for ratings regarding the importance of management skills in business administration as perceived by employers of agriculturalists in Costa Rica (N=148)

Specific knowledge area	Valid cases	Mean*	S.D.
Develop marketing strategies	147	3.80	1.26
Plan and conduct products exports	146	3.47	1.24
Conduct financial analysis of the company	147	3.94	1.07
Conduct feasibility studies	142	3.88	1.02
Be able to include environmental cost and be able to make decisions based on the results	144	3.84	0.97
Think and behave as a manager	147	4.45	0.80
Manage and control the budget	143	4.34	0.89
Understand and apply practical concepts of accounting	145	3.74	0.98
Apply Total Quality managerial style	145	4.35	0.76

*Scale: 5 = very important; 1 = not important

(x= 4.25; S.D.= 1.11); (2) manage pest control chemicals (x= 4.31, S.D.= 1.05); and (3) Develop pest management systems (x= 4.27; S.D.= 0.98). The other items in this category were considered to fall between the levels of somewhat important to less important. Table 21 presents the results for this area.

Computer skills was one of the areas presented for rating based on the perceptions of the potential employers of agriculturalists in Costa Rica. Their answers revealed that they considered this to be an area of primary importance. Specifically, and in order of importance, they indicated agriculturalists should be able to manage basic computer programs (x=4.41, S.D.= 0.85) and utilize computer packages for data management (x= 4.31, S.D.= .85). Table 22 presents the data.

Table 21. Means and standard deviations for ratings regarding the importance of having skills in field-related activities as perceived by employers of agriculturalists in Costa Rica (N=148)

Specific knowledge area	Valid cases	Mean*	S.D.
Soil and water management and conservation	142	4.25	1.11
Management of pest control chemicals	142	4.31	1.05
Develop pest management systems	143	4.27	0.98
Operate and give maintenance to agricultural equipment	143	3.09	1.22
Use techniques and methods that are geared to animal health	142	2.78	1.41
Prepare rations	141	2.45	1.36
Pasture management	141	2.77	1.44
Build farming infrastructure	142	2.84	1.17
Be able to perform daily routine field activities	141	3.40	1.28
Record keeping systems	138	3.71	1.20
Identify adequate methods and techniques used for animal reproduction	137	2.57	1.45

*Scale: 5 = very important; 1 = not important

Table 22. Means and standard deviations for ratings regarding the importance of having computer skills as perceived by employers of agriculturalists in Costa Rica (N=148)

Specific knowledge	Valid cases	Mean*	S.D.
Manage basic computer programs	147	4.41	0.85
Use of computer packages for data management	147	4.31	0.85

*Scale: 5 = very important; 1 = not important

The study sought to determine the perceptions of the respondents regarding the importance of knowledge pertaining to the area of the management of quantitative and qualitative information. It was deemed important for agriculturalists to be able to: (1) make decisions based on statistical results (x= 4.42, S.D.= 0.73); (2) interpret statistical results (x=

4.25, S.D.= 0.83); and (3) analyze statistical data (x= 4.21, S.D.= 0.89). Table 23 presents the results for this area.

Another important area which was addressed in this study, was that of interpersonal relations. Respondents were asked to rate their perceptions of the importance of this area. The results indicated interpersonal relations skills were perceived to be an area of strong importance. Table 24 presents the results of the perceptions of the respondents regarding interpersonal relations.

Respondents were asked to give their perceptions regarding the importance of communication skills by rating several topics pre-established by the researcher. The results demonstrate that the perception exists that communication skills are important. Although the topic of communication rated among the most important of this study, the following two items were considered to be only somewhat important: effective communication skills in

Table 23. Means and standard deviations for ratings regarding the importance of knowing how to manage quantitative and qualitative information as perceived by employers of agriculturalists in Costa Rica (N=148)

Specific knowledge	Valid cases	Mean*	S.D.
Interpret statistical results	147	4.25	0.83
Analyze statistical data	146	4.21	0.89
Plan, organize and conduct surveys	146	3.36	1.22
Plan and develop applied research	143	3.78	1.17
Plan and develop research with laboratories and or research centers	142	3.32	1.26
Make decisions based on statistical results	140	4.42	0.73

*Scale: 5 = very important; 1 = not important

Table 24. Means and standard deviations for ratings regarding the importance of having skills in the area of interpersonal relations as perceived by employers of agriculturalists in Costa Rica (N=148)

Specific knowledge	Valid cases	Mean*	S.D.
Work in group	148	4.76	0.50
Delegate responsibility	148	4.53	0.73
Make decisions	147	4.82	0.45
Solve conflicts	146	4.68	0.68
Select, supervise and evaluate personnel	147	4.40	0.86
Motivate and provide incentives to personnel	146	4.55	0.76
Adapt to different job conditions	147	4.72	0.61
Work without supervision	143	4.64	0.71
Maintain a positive attitude towards the job	145	4.90	0.34

*Scale: 5 = very important; 1 = not important

English (x= 3.70, S.D.= 1.03), and the use of visual aids to help with information delivery (x= 3.83, S.D.= 1.20). Table 25 presents the detailed information regarding this important area.

One of the last subjects considered in this research study were issues related to the importance of possessing skills to disseminate information to end-users. The respondents considered it was important for agriculturalists to be able to plan, organize and conduct activities related with extension work (x= 4.15, S.D.= 1.01), and to provide technical assistance (x= 4.42, S.D.= 0.87). It was considered to be somewhat important for agriculturalists to be able to plan, organize and conduct activities related to rural development (x= 3.83, S.D.= 1.13). Table 26 presents the results regarding this area.

Table 25. Means and standard deviations for ratings regarding the importance of having communication skills as perceived by employers of agriculturalists in Costa Rica (N=148)

Specific knowledge	Valid cases	Mean*	S.D.
Communicate written ideas effectively	148	4.65	0.60
Write technical reports	147	4.48	0.71
Comprehension of technical information written in Spanish	145	4.49	0.76
Effective when communicating ideas verbally	148	4.66	0.57
English reading comprehension	145	4.08	1.03
Effective communication skills in English	142	3.70	1.10
Use of visual aids to help deliver information	145	3.83	1.20
Understand and follow instructions	146	4.52	0.66
Train personnel	144	4.37	0.83

*Scale: 5 = very important; 1 = not important

Table 26. Means and standard deviations for ratings regarding the importance of skills needed to disseminate information as perceived by employers of agriculturalists in Costa Rica (N=148)

Specific knowledge	Valid cases	Mean*	S.D.
Plan, organize and conduct extension activities	147	4.15	1.01
Provide technical assistance	145	4.42	0.87
Plan, organize and conduct rural development activities	145	3.83	1.13

*Scale: 5 = very important; 1 = not important

Hiring process

The researcher requested the respondent's perceptions of the methodology to be utilized during the hiring process. The categories, which were pre-established by the researcher, were: (1) personal interviews; (2) review of résumé and curriculum vitae; (3) telephone interviews; or (4)administering a theoretical/practical exam. Of these methods,

144 (97.7%) of the respondents indicated that during the interview and hiring process, they preferred using a personal interview. The possibility that was least desirable was that of telephone interviews: 8 (5.4%) selecting this option. Table 27 presents the data.

Another question addressed in the study regarded the importance of the completion of an internship associated with the candidate's academic program. In this regard, the respondents indicated the completion of an internship program would be considered to be an asset by the potential employer. Of the 148 respondents, 134 (90.5%) indicated that an internship would be important. Only 8 (5.4%) indicated this activity would not impact the hiring process. Six (4.1%) individuals did not answer the question. Figure 10 presents the data.

As indicated before, one of the objectives of this study was to gather information that would aid in the determination of the job market and potential job markets for *Ingenieros Agrónomos* in Costa Rica. The members of the research population were asked how many agriculturalists the entity for which they were employed had hired in the last three years. In

Table 27. Hiring processes used by potential employers of agriculturalists in Costa Rica

Specific knowledge	Used		Not used		No response	
	No.	Percent	No.	Percent	No.	Percent
Personal interviews	144	97.3	–		4	2.7
Reviewing of vitae	132	89.2	2	1.4	14	9.5
Telephone interviews	8	5.4	59	39.9	81	54.7
Theoretical and practical exams	30	20.3	46	31.1	72	48.6

*Scale: 5 = very important; 1 = not important

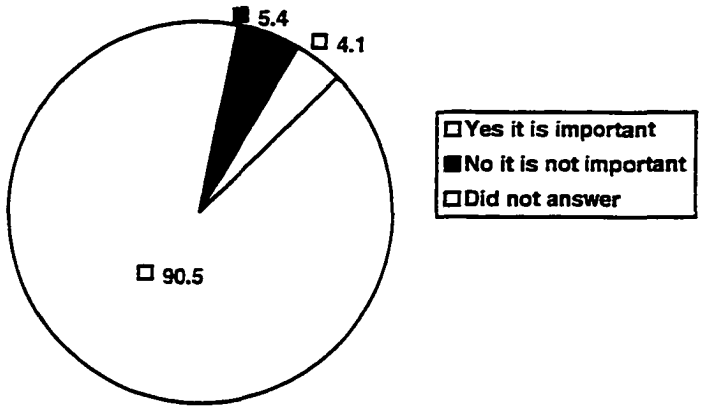


Figure 10. Respondents' perceptions regarding the importance of completion of an internship in association with academic preparation

addition, they were asked in what areas (i.e., animal science, forestry, etc.) the agriculturalists had been hired. The respondents indicated the following two areas in which the majority of the employees were hired in the last three years: 83 individuals were hired to provide technical assistance services and 82 were hired in agricultural production. The area in which the least number were hired was in forestry, with only 17 individuals being hired. The data gathered in this area were considered in association with the type of entity for which the respondents were employed (i.e., private, international or governmental) (Table 28).

To further aid in the evaluation of the job market for future graduating agriculturalists, the respondents were asked to give a projection of how many professionals the entity for which they were employed planned to hire over the course of the two calendar years which followed the collection of data. To more fully consider the information, the data is presented in Table 29 not only with the raw numbers, but also by the type of entity for which the respondents were employed (i.e., private, governmental, international). In addition, the specific areas in which new agriculturalists were to have been employed is also presented.

Table 28. Number of agriculturalists hired in Costa Rica in the last three years by area of specialization

Employment area	Total	Private	Government	International
Agricultural production (plant)	82	57	6	19
Animal production	18	18	0	0
Forestry	17	12	5	0
Natural Resource management	22	17	4	1
Agricultural engineering and mechanization	26	21	2	3
Post-harvest crop management	32	23	5	4
Food processing	32	26	2	4
Sales	46	40	2	4
Marketing	40	30	5	5
Credit and finance	26	12	11	3
Research	57	40	10	7
Training and extension	52	32	18	2
Technical assistance	83	54	23	6
Administration	65	51	6	8

Data revealed that in the private sector, respondents indicated the intention to hire 54 agriculturalists in the area of agricultural production. This number is followed by the intention by the governmental sector to hire 47 new employees to work in the area of technical assistance. Respondents identifying themselves as belonging to the international sector projected the hiring of 16 agriculturalists in the area of agricultural production. The areas which were determined to have the intentions of hiring the least number of

Table 29. Projections of the number of professionals that entities participating in the study in Costa Rica are planning to employ in the next two years and how many of those will be agriculturalists (N=148)

	Private		Governmental		International	
Employment area	Total[1]	Agric.[2]	Total[1]	Agric.[2]	Total[1]	Agric.[2]
Agricultural production (plant)	78	54	19	14	16	16
Animal production	14	9	0	0	0	0
Forestry	5	2	10	4	0	0
Natural resource management	2	2	24	3	3	0
Agricultural engineering and mechanization	12	7	0	0	2	0
Post-harvest crop management	24	10	7	7	3	2
Food processing	5	4	0	0	2	1
Sales	55	32	0	0	0	0
Marketing	24	23	26	11	2	2
Credit and finance	2	1	14	12	0	0
Research	23	20	5	3	4	2
Training and extension	13	8	1	1	1	1
Technical assistance	31	25	47	47	6	6
Administration	19	7	10	10	2	0

[1] Total individuals projected to be employed
[2] Total agriculturalists projected to be employed

agriculturalists were the areas of credit and finance in the private sector; extension in the governmental sector, and extension and food processing in the international sector. Each of these combined areas indicated they projected to hire only 1 agriculturalist in the two years following the collection of data.

CHAPTER V. DISCUSSION

The main purpose of this study was to determine the knowledge and skills needed by *Ingenieros Agrónomos* with the *Licenciatura* title, also referred to as Agriculturalists, as perceived by potential employers in agriculturally related businesses, governmental and non-governmental agencies as well as the international development sector of Costa Rica. A secondary purpose of the study was to use this information in the curriculum review process at EARTH College. An additional purpose of this study was to develop a valid and reliable instrument that could serve as the basis for further research in other countries represented by the EARTH College student population. A list of countries represented by students at the EARTH College is found in Appendix B.

The objectives of this study were fivefold:

1. Identify technical skills required for employment in the agricultural sector as perceived by the individuals, businesses, and organizations which are considered to be potential employers of agriculturalists in Costa Rica.
2. Identify knowledge required for employment in the agricultural sector as perceived by the individuals, businesses, and organizations which are considered to be potential employers of agriculturalists in Costa Rica.
3. Identify specific information regarding skills and knowledge perceived as important by potential employers of EARTH graduates to be used in the College's on-going general curriculum review.

4. Identify information that will reflect specific areas of perceived importance in the agricultural sector of Costa Rica in order for the College administrators to identify subject specialty areas as senior year elective courses.
5. Determine and verify the instrument validity in order to replicate this study in other countries in Latin America from which the EARTH College has students represented.

Comprehensive Profile of the Potential Employers of Agriculturalists in Costa Rica

In order to understand the agricultural employment sector, it is necessary to develop a profile of the individuals who are potential employers of agriculturalists in Costa Rica. For the purpose of this study, individuals who are considered potential employers in agriculturally related businesses, governmental and non-governmental agencies as well as the international sector of Costa Rica, are referred to as potential employers of agriculturalists in Costa Rica.

As indicated in Figure 1, the majority of the respondents were male (89.9%). This figure was considered to be normal and was not unexpected, since agriculture is still a traditionally male-dominated field in Latin America. The age of respondents was distributed evenly, with the percentages between the six age groups not varying over 10.1%. No one age group greatly exceeded another age group in size. It was not a surprise to find that 89.2% of the respondents' nationality was Costa Rican, followed by Venezuela (2.0%) as the second largest country represented, but with a great difference in percentage when compared to the Costa Rican group. Several countries did appear but none had more than one individual from the same country.

Analyzing the respondents' educational level it was noticed that they had a high level of education. It was considered to be a high level based on the fact that nearly 90% of the respondents had a university degree with either a bachelor's, *licenciatura*, master's or doctorate degree. Of these individuals, 71.6% received their degrees in Costa Rica, and 24.3% obtained their degrees in a country other than Costa Rica. Looking at these numbers, one can infer that a great majority of the respondents knew the Costa Rican educational system well since they went through it. However, another group has a different perspective of what an agriculturalist should be qualified to do because of their foreign perspective, since their degree was obtained from a country other than Costa Rica. These data reinforce the premise that the potential employers who made up the respondents of this study were highly qualified and had a diverse educational background.

The majority of the respondents (45.9%) had less than 6 years working with the entity they were representing. The remaining respondents had more experience working with the entity they were representing as they had worked between 6 and 20 years. When asked to identify their job responsibilities from a pre-established list, it was found that the respondents most frequently identified themselves as being a combination of a technician and an administrator (48%). Another 30.4% identified themselves as administrators and 18.2% as technicians. This means that a majority of the respondents did work in both areas, the technical and the administrative, which gave them a broader perspective of what was needed in both areas.

Entity profile

The researcher considers that it is important to develop a profile of the entities that will be hiring agriculturalists in Costa Rica. This will help to understand the perceptions of the respondents of these entities regarding the skills and abilities needed by agriculturalists who would be hired by them.

Respondents were asked to define the type of entity they represented. A total of 73% of the respondents identified their entities as pertaining to the private sector, 16.2% were part of the governmental sector, and 10.1% were in the international sector. The high percentage of entities belonging to the private sector was not surprising. Costa Rica is a country where agriculture plays an important role in the Gross National Product (GNP). Production is in the hands of the private sector, with the governmental sector providing basically only technical assistance, which probably accounts for the low percentage in that sector. Another interpretation of these numbers is the fact that, similar to most countries, the agricultural sector is the one were there is less investment from the government, thus the private sector responds more to fill the void created by the government.

When identifying the principal objective of their entity, 36.5% of the respondents selected production, followed very closely by 20% in marketing and distribution. These responses also indicate that most entities are mainly in the private sector. Rarely does the government have production as an objective; this is an objective that is located basically in the private sector of most countries that have a democratic political system.

Respondents were asked to identify from a list of 12 activities, those activities that were undertaken by their entities. As the activities were not mutually exclusive, respondents

were free to select more than one area in which their entity was active. The respondents had also the opportunity to add specific activities that were not listed. A total of 481 activities were selected by the respondents, with several additional categories arising that were not anticipated. The activity that was selected the most by the respondents was in the area of production (175). Agricultural production was selected by 91 respondents, with animal production by 25 respondents, vegetable production by 29 respondents, flower production by 12 respondents, and ornamental production by 18 respondents. These numbers give more validity to the statements previously stated based on the type of entity (predominant private), and the type of activity (production as the most important). The results also provide valid information that the entities in the agricultural sector in Costa Rica undertake a variety of activities. Very few dedicate themselves to only one activity.

Other information that gives insight into the type of entities that exist in the agricultural sector in Costa Rica was the number of years that the respondents had been active in agriculture. It can be seen that most of the entities (54%) participating in the study were less than 20 years old . This information reflects the views of Rachowiecki (1991) who stated that not until after the middle of the 19th century Costa Rica changed its agriculture from being a subsistence agriculture to an agriculture dedicated to production and exports. It is logical, therefore, that most of the groups of this study are relatively young entities in agriculture.

Respondents were asked to define the size of the entities they represented. Raw data were collected and placed into five categories by the researcher. What was found is that the entities are either small, less than 25 persons (38.5%), or very large with more than a 100

persons (35%). It can be assumed this is a contrast between family-owned entities or trans-national entities.

Another issue regarding the profile of entities, was how they hired personnel. Most respondents indicated that it was through personal interviews and review of curriculum vitaes. This indicates the potential employer's interest in the agriculturalist's interpersonal and communication skills, as well as technical and practical skills.

Perceptions of the Respondents Regarding the Importance of having Technical and Practical Agricultural Skills

The main purpose of this study was to determine the knowledge and skills needed by agriculturalists as perceived by potential employers in agriculturally related businesses, governmental and non-governmental agencies as well as the international development sector in Costa Rica. To achieve these goals, respondents were asked to share their perceptions regarding skills and knowledge they perceived as important for an agriculturalist to possess. Respondents were asked to rate from 1 to 7 from a list of pre-established skills, with 7 being most important and 1 not important. The results of this rating showed that agricultural production was rated high by 97 of the respondents, followed in importance by post-harvest skills which 65 of the respondents rated moderately high. Food processing was rated as fourth by 23 of the respondents. Natural resource management was rated as third by 45 of the respondents, and agricultural engineering and mechanization by 31 respondents. Forestry was rated second by 32 respondents, and animal production was placed in first position by 65 respondents. These results are supported by what Viñas-Román (1996) analyzed in his paper presented in a workshop in Chile. His research highlights the importance of production,

post-harvest and food processing, in the future of Latin American agricultural development and the need to benefit consumers.

The respondents were also asked to rate technical and practical skills they considered important for an agriculturalist to possess. The same scale was used (7 being important and 1 being not important). A list of technical and practical skills was established by the researcher. Respondents considered it important that agriculturalists should be skilled in management, be skilled to work in the field, have good interpersonal skills and communication skills, and be able to disseminate information. The respondents rated moderately the use of computers, and analysis of quantitative and scientific information. Applying sustainable concepts was identified at the lowest priority when hiring an agriculturalist. A study conducted in Honduras by Moya, Jimenènez and Andrews (1996), concluded that of the 75 employment issues they were surveying regarding professional agriculturalists of the future, the first 11 skills were personal attributes, and the 6 following characteristics had to do with communication skills. Item 17 was a technical skill. Obviously, technical skills were not rated as important as personal skills.

Perceptions of Specific Skills Needed by an Agriculturalist to be Employed

A specific objective of this study was to identify technical skills required for employment in the agricultural sector, knowledge required for employment in the agricultural sector, and specific information regarding skills and knowledge needed by EARTH graduates that could be incorporated into EARTH's ongoing general curriculum review process. This

information was derived from the perceptions of the members of the research population who were defined as potential employers of agriculturalists in Costa Rica.

Respondents were asked to rate on a scale of 5 to 1 (5 being important and 1 not being important) the technical skills needed by agricultural employers in Costa Rica. When asked about the areas in animal production, the respondents' perceptions were that it was not an important skill area. Another area that respondents were asked to give their perceptions was traditional and non-traditional crops. Respondents perceived it as somewhat important that agriculturalists be skilled in non-traditional crops. Knowledge in the area of medicinal plants was perceived to be less important. These results reflect current trends; there are not many entities who work with medicinal plants. In fact, this is an area that is primarily handled by small groups of women in rural communities. They are only beginning to enter the production, post-harvest and marketing arena.

Forestry was another area that was considered. Respondents perceived forestry plantation management and greenhouse management as somewhat important. In the area of natural resource management, soil conservation practices and soil and water management were considered to be important.

Regarding the area of sustainability, respondents considered that it was important that agriculturalists know about producing while using technology that would reduce contamination. As an example of this, respondents were concerned that agriculturalists could properly manage pest control chemicals and be able to develop pest management systems. Up to this point, it is evident that potential employers are concerned in producing basically traditional and non-traditional crops. They are less interested in animal production. There is

also a concern regarding the way one produces. The current trend identified is to use sustainable practices that reduce contamination. A concern related with all of the above is soil and water management, and soil conservation practices that agriculturists should know about. The fact that Costa Rica is a pioneering country regarding sustainability and natural resource management could account for this general concern.

Regarding the area of post-harvest management, an issue important for the respondents was that agriculturalists could identify systems wherein they could reduce product loss during the process of handling and transporting. In general, the area of food processing was considered as somewhat important. Respondents did not perceive this area to be of great importance. These responses could be based on the fact that, currently, employers are more concerned in the producing and selling of fresh products. They are not interested in processing products to be sold later at an added value.

In the managerial area, respondents considered it important that an agriculturalist would be able to think and behave as a manager, manage and control budgets, and apply Total Quality Management skills. A related area is that of computer science. Respondents considered it important that agriculturalists could manage basic computer programs, especially those packages developed for data management. Another related area that was perceived important by the respondents was the one related to understanding, analyzing and making decisions based on statistical data. Based on this information, the agriculturalist that potential employers would be looking for is an individual who has a managerial outlook, has knowledge of computer technology, and can make decisions based on statistical results.

Respondents considered that interpersonal relations, all the issues presented in the questionnaire related to effective communication skills, and skills relating to the dissemination of information are important areas an agriculturalist should have. The responses revealed that respondents have a great interest in skills that are related to dealing with people, communicating effectively, and providing and disseminating information. This information is closely related to what is been proposed by FAO (1991). They stated that, if agriculturalists are the ones who have the information, they need to be able to deliver it to the ones—the farmers—who are going to use it.

Respondents also perceived a great interest in the agriculturalist having some work experience. This was manifested through their interest in having agriculturalists complete an internship program before starting a formal job. A great majority of the respondents (90.5%) indicated that having a internship program for agriculturalists was perceived as an important issue to be considered in Agricultural Education. This clearly indicates that previous experience is needed and highly valued by potential employers.

Based on the results of the study, a model was developed to create a system to enable curriculum developers to revise EARTH's curriculum to include the needs and perceptions of potential employers of agriculturalists in Costa Rica. The model is presented in Chapter 6.

CHAPTER VI. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to determine the knowledge and skills needed by *Ingenieros Agrónomos* with the *Licenciatura* title, referred to as agriculturalists, as perceived by potential employers in agriculturally related businesses, governmental and non-governmental agencies as well as the international development sector of Costa Rica. A secondary purpose of the study was to use this information in the curriculum review process at EARTH College.

An additional purpose of this study was to develop a valid and reliable instrument which may serve as the basis for further research in other countries represented by the EARTH College student population. For the purpose of this study, companies, organizations, institutions, and agencies that work in agriculture or agriculture related activities in Costa Rica and are also potential employers of agriculturalists, were defined as entities.

Summary

During 1990 the agricultural, forestry, fishery and mining sectors of Costa Rica, represented something between 10% and 15% added value to the region. A big change occurred in the region's added value. The change focused on the service sector becoming the top sector. A problem that this represents is that an economy based on services requires an important change in the structural production and consumer attitude towards products that come from agriculture, forestry and related areas. The reality is that the agricultural sector is

going through a drastic change; for instance, the economic active population in 1975 was 47.7% and in 1990 it dropped to 37.4% (Viñas-Román, 1996).

On the other hand, according to Moreno (1993), Latin America's agriculture needs to achieve simultaneously the following objectives: find a point of equity, be sustainable, and be profitable and competitive. In his article Moreno mentioned that there are several ways of achieving these objectives, but he believed that enhancing the preparation and attitude of new professionals in agriculture is a must in the entire process. The required changes at the institutional level, both public and private, will be attained only through individuals who are properly trained for the task (Moreno, 1993).

Presently, there is a widespread difference between the education that is offered by institutions of higher education in Latin America in the agricultural sciences and the concrete needs of farmers (FAO & ALEAS, 1991). This is particularly true when it comes to the needs of small farmers. In the publication *Educación Agrícola Superior en América Latina: sus problemas y desafíos* (FAO & ALEAS, 1991), the authors state that colleges and universities are not meeting the needs of national and international companies which hire young professionals graduating from agricultural educational centers.

This research study was descriptive in nature and employed the use of a survey instrument. The research population for this study was comprised of individuals who worked with entities (i.e., institutions, organizations, companies), that work in agriculture or agriculture related activities in Costa Rica, and are also potential employers of agriculturalists.

It was determined that a comprehensive listing of agricultural entities in Costa Rica did not exist. Thus it was necessary to conduct an extensive in-depth investigation which took approximately three months in order to identify the research population for this study. All valid institutions were included in the research population.

The research instrument was developed based upon the research objectives and then reviewed by a select group of individuals who were knowledgeable in the subject area. Two questionnaires were distributed to each of the 149 valid entities included in the population, for a total of 298 questionnaires. The number of usable questionnaires returned was 148, or 49.5%. The majority of the data were collected between the end of June and July 1995. Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS).

Major Findings

The following are the major findings of this study:

1. The majority of the respondents worked either at the administrative or technical level or a combination of both.
2. Age was not a limiting factor to work at any of the entities, since it was found that there was a good spread of ages starting at 25 and below, all the way to 46 and above. No single age group greatly exceeded in number over another age group.
3. The majority of the agriculturalists employed were Costa Rican (89.2%), but other nationalities were also represented at different entities and job levels.
4. Most of the respondents possessed either a bachelors degree (33.8%) or a *Licenciatura* degree (33.8%), but all had at least a high school degree.

5. Most of the respondents were male (89.9%).
6. There is a great diversity of the population regarding areas of specialization at the various entities consulted.
7. The entities considered as potential employers of agriculturalists in Costa Rica were categorized as follows: 73% in the private sector, 16.2% in the governmental sector and 10.1% in the international sector.
8. The principal operation of the entities was production (36.5%), followed by marketing and distribution (20%). The remaining 43.5% was widely spread among different agricultural activities.
9. The entities carried out a total of 481 different activities, even though most of the respondents identified their entities as having a specific objective.
10. The respondents' selection process when hiring an agriculturalist was based on personal interviews and curriculum vitae.
11. Agricultural production was the most important activity for the entities in the study.
12. Animal production is not perceived as an important skill area an agriculturalist should posses.
13. The area of medicinal plants was not considered as important in the view of traditional and non-traditional crops.
14. The management of forestry plantations and greenhouse management were considered somewhat important skill.
15. Among the natural resource management issues, soil management and conservation were considered important activities, as well as water management.

16. The use of technology that would reduce contamination during production, and the proper management of chemicals in pest control, were considered as important skills agriculturalists should possess.
17. The respondents considered that an agriculturalist should know about methods to reduce the loss of products during post-harvest, especially during their handling and transportation.
18. In the management area, the respondents considered it important for an agriculturalist to think and behave as a manager, control budgets, and apply Total Quality Management skills.
19. In the area of computer science, respondents considered that agriculturalists should be able to work with basic computer packages, especially those developed for data management.
20. The ability to understand, analyze and make decisions based on statistical data was considered to be important.
21. Agriculturalists should possess interpersonal skills such as the ability to work in a group, to delegate functions to others, to make decisions, to solve conflicts, to select, supervise and motivate personnel, to adapt to diverse working conditions, to work without supervision, and to have a positive attitude towards the job.
22. In the communications area the aspects considered to be important were: effective oral expression, writing of technical reports, reading technical information in Spanish, verbally expressing ideas effectively, comprehending technical information and being able to communicate effectively in English, usage of visual aids to facilitate the

communication process, understanding and following instructions, and personnel training.

23. The abilities to disseminate information, plan and conduct extension activities, provide technical assistance, plan, organize and conduct rural development activities, were skills that an agriculturalist should possess.
24. It was important for an agriculturalist to have work experience. This experience could be partially obtained through an internship program.
25. Entities in this study were interested in an agriculturalist that is not a specialist, but rather a generalist with a strong knowledge in production, post-harvest management, food processing management skills, computer skills, interpersonal skills, good communication skills, and with the ability to adequately disseminate information.

Conclusions

The objectives of the study were to determine the knowledge and skills needed by agriculturalists as perceived by potential employers, and to identify specific knowledge and skills that potential employers wish graduates to possess. The following conclusions were made based upon the major findings of this study:

1. The educational background of the population and the fact that most of its members were working at the administrative and technical levels, provided highly qualified responses. The diverse working expertise of the participants provided the study with a variety of areas represented in agriculture.

2. Agriculture is still a male-oriented profession, even though the participation of women in agriculture is increasing.
3. Even though the area of medicinal plants is exhibiting a great potential not only in Costa Rica but in the rest of the world, the respondents did not perceive it as important. This could be because the majority of the production is in the hands of organized rural women, and these women produce and sell their products either to transnational corporations or to industries that transform the product and sell it later.
4. Costa Rica has established strong policies regarding the appropriate use of forest resources; however, the agricultural sector is either ignoring the policies or it is not interested in supporting them.
5. On the other hand, other ecological issues such as contamination and the conservation of soil and water were perceived as important. One could conclude that there is a sensivity regarding the appropriate use of land for agricultural purposes.
6. Costa Rica's economy is based on agriculture and one of the biggest challenges is to be competitive in the international market. A reflection of this is the importance given by the respondents to the fact that future graduates should have knowledge in the area of post-harvest management. There is a need to produce but also to export the products out of the country by meeting the standards consumers of other countries are demanding.
7. The agricultural sector in Costa Rica is not only interested in producing, but also in the people who work and who are related to this sector. The responses regarding the

issues of Total Quality Management, interpersonal skills and communication skills indicate a high demand for people skills.

8. The agricultural sector in Costa Rica is interested in understanding and applying technology to its advantage. This trend is obvious in most aspects of modern life, and it is important to notice its growing influence in agriculture.
9. The fact that the entities show a preference towards generalists in agriculture indicates the growing concern of society to produce well rounded individuals who will help Costa Rica survive in a global scheme to enter and be successful in the international marketplace.

Recommendations

Based upon findings and conclusions of this research study, the following recommendations were formulated:

1. An analysis of the actual curriculum of all educational institutions in Costa Rica that are dedicated to prepare agriculturalists should be carried out in order to identify strengths and weaknesses of each individual program of study. In addition, there is a need to analyze the capacity of the institutions to offer the type of agriculturalist different entities need.
2. Institutions dedicated to the preparation of agriculturalists at the bachelor and *licenciatura* degree level should have more of a generalist focus and move away from the practice of just graduating specialists in different areas of agriculture.

3. As they relate or the findings of this study, institutions dedicated to preparing agriculturalists should focus their programs of study in a number of areas that have been identified as important for potential employers of agriculturalists in Costa Rica.
4. The profile of agriculturalists who could be hired by a potential Costa Rican employer should:
    a. Be a generalist, not a specialist;
    b. Have a well rounded knowledge of sustainability;
    c. Be practical;
    d. Have knowledge in forestry and natural resource management;
    e. Have knowledge in agricultural engineering and mechanization;
    f. Have research skills;
    g. Know about food processing;
    h. Think and behave as a manager;
    i. Have knowledge of Total Quality Management;
    j. Have good communication and interpersonal skills and be able to disseminate information effectively;
    k. Be up-to-date in computer basic skills; and
    l. Be able to understand, analyze and make decisions based on statistical data.
5. The findings of this study should be disseminated in Costa Rica among all institutions, agencies, organizations that deal with agriculture and agriculturalists, especially the ones that are preparing these individuals.

Recommendations for further study

The following recommendations are made for further study:

1. The data from this study should be further analyzed to reveal more information and findings that are based on the purpose and objectives of this study.
2. The data from this study provide a basis for further research among institutions, organizations, companies, and agencies dedicated to agricultural higher education in Costa Rica.
3. Similar research should be conducted in other Latin American countries in order to identify what is currently being offered by agricultural education entities and what is needed by the agricultural sector, and also analyze if demands and preparations are synchronized.
4. An area that was not covered in this study but would provide valuable information is the needs of farmers. If possible, a similar study should be conducted among farmers to identify their perceptions and specific needs.

Recommendations for use of the research instrument

First, the recommendations of the research instrument include a description of the systems that presently serve the college and could be incorporated in the use of the model (Figure 11):

- A process promoting the school is carried out by either faculty members or graduates in each country annually.

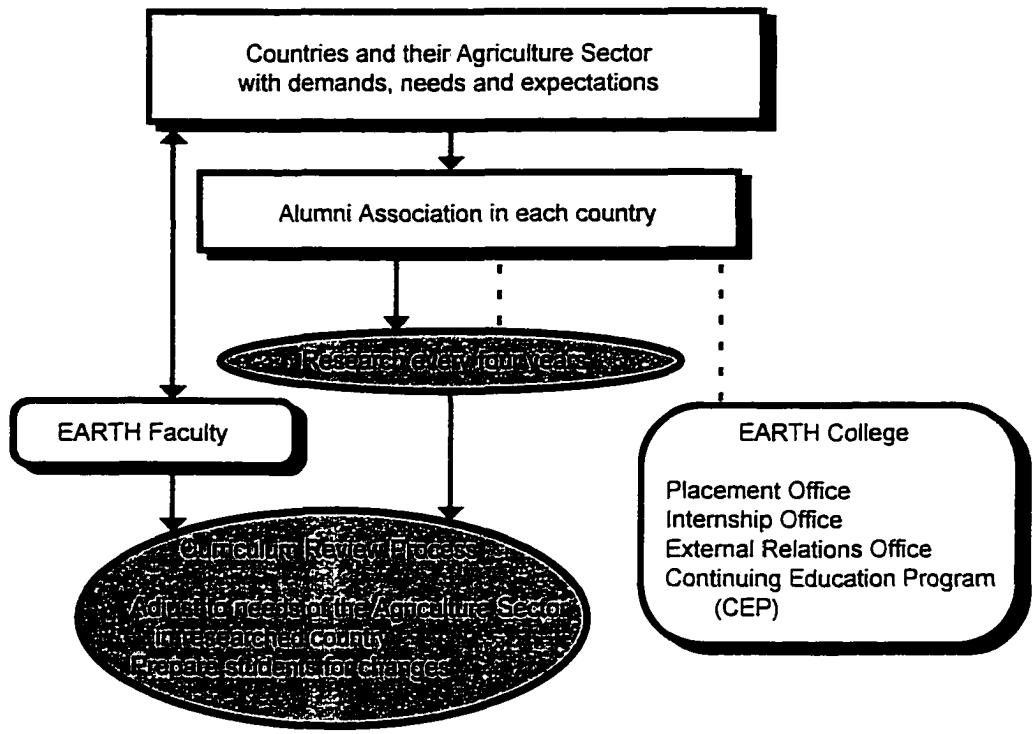


Figure 11. Proposed model for curriculum and program review at EARTH College

- A selection process is conducted by faculty members in the countries where students have sent their application forms and have been pre-selected.
- EARTH College receives students from 17 to 20 countries annually.
- Alumni Associations are in place in several countries, with the goal to have one such association in each country where EARTH has graduates.
- Professional agreements are made between faculty members and the agricultural sector of the countries from which EARTH receives students.
- The Placement Office and the Internship Office have established strong professional relationships with key entities in the 17 to 20 countries that serve EARTH's students.

- The External Relations Office has good linkages with all the countries and entities in these countries.
- There is a unit for Continuing Education, PEP, where professionals belonging to the agriculture sector from different countries meet to participate in training related to the sector.

The activities that have been mentioned previously can be considered strengths of the system. These activities are conducted at different times and are now part of a systematic way of obtaining valid information regarding changes, needs and expectations of what is needed or perceived of importance for EARTH's graduates to posses before they return to their home countries and become part of the work force in the agricultural sector.

The model suggests a way of systematizing all these activities in a manner that would provide a continuous flow of information, and a channel to replicate the study periodically in countries of interest to the college. The data gathered would provide the school with reliable information that could be used in the curriculum review process in order to adjust to changes in the Agricultural Sector, be currently informed of new trends, and prepare students in what the labor market is expecting of them.

To implement the model the following procedures could be followed:

1. There are 17 to 20 countries represented in our student population. These countries have Agricultural Sectors with their own characteristics, demands and needs, and also expectations.
2. Each country's characteristics, needs and expectations in the agricultural sector will provide information to either the faculty and or alumni association.

3. The Alumni Association would be responsible of conducting the research periodically in country.
4. EARTH College could conduct the research with graduates through the Alumni Association.
5. When faculty travel to different countries they could organize activities where selected members of the agricultural sector, that have been previously selected with the help and expertise of the Internship and Placement program and also with the help of the EARTH External Relations Office; would be called upon, and the instrument would be applied to them.
6. Potential employers of agriculturalists could be invited to participate in different types of activities at EARTH College, and during the visit the instrument could also be applied to them.
7. EARTH College would have to establish the frequency it believed the research should be conducted in order to make adjustments to the curriculum. It would also have to be clear as to who was to be the target audience for this type of study.
8. The information that is gathered through this research process will be an important element in the curriculum review process. It should be used to adjust the curriculum to the needs of the Agricultural Sector of the country where the research was conducted. It will also prepare students for change.

Implications for agricultural education

This study has provided data on a variety of subject matter areas related to what is important for entities that are potential employers of agriculturalists. Entities preparing agriculturalists have information that could help in planning and adjusting programs of study. This study enables a comparison of what is being offered and what is really needed. It is envisioned that the information from this study may serve as a basis to evaluate, adjust, adapt and improve the curriculum according to real and practical needs of public, private and international entities so that the agricultural sector can be restructured and re-established in order to achieve its maximum potential.

APPENDIX A. LIST OF COUNTRIES REPRESENTED BY STUDENTS AT EARTH COLLEGE

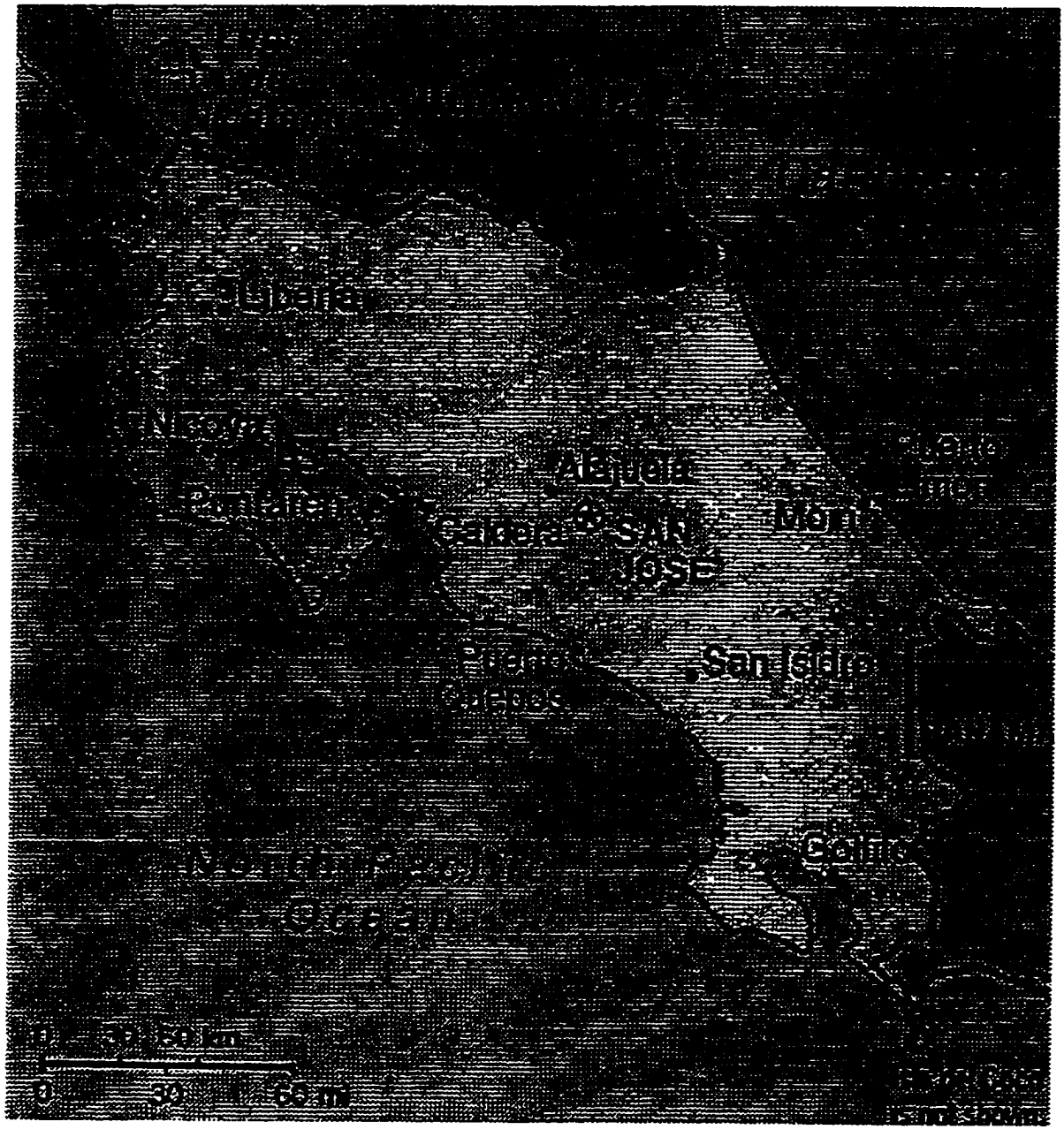
EARTH College has a population of approximately 400 students, originally hailing from 17 different countries:

1. Belize
2. Bolivia
3. Brazil
4. Colombia
5. Costa Rica
6. Dominican Republic
7. Ecuador
8. Guatemala
9. Honduras
10. Mexico
11. Nicaragua
12. Panama
13. Paraguay
14. Peru
15. El Salvador
16. Uruguay
17. Venezuela

(the countries below were added recently)

18. Puerto Rico
19. Canada
20. U.S.A.
21. Spain

APPENDIX B. MAP OF COSTA RICA



APPENDIX C. RESEARCH POPULATION

1. Republic Tobacco Company
2. Trisan
3. Agro Pro Centro America S.A.
4. Bananera Las Marias S.A.
5. Compana Agrícola de Guácimo y Pocicí
6. Compañía Bananera La Indiana S.A.
7. Compañía Bananera de Matina C.B.M.S.A.
8. Corporación PIPASA S.A.
9. Agroindustrias Río Palacios S.A.
10. BABACOL de Costa Rica S.A.
11. BANACOL de Costa Rica S.A.
12. Harrigan Mix
13. Ternerina S.A.
14. Zuímicos Holanda Costa Rica S.A.
15. R.P.A. de Costa Rica
16. LAQUINSA
17. SERACSA
18. Distribuidora Agro Comercia S.A.
19. ROHN AND HASS
20. Sandoz S.A.
21. VETAQUIM S.A.
22. Compañía Costarricense del Café S.A.
23. ZENECA Agroquímicos
24. CYANAMID de Costa Rica S.A.
25. ELF A TOCHEN
26. INDAGRO S.A.
27. MAGAN AGRO S.A.
28. FORQUINSA
29. Agro Tico
30. Agromart S.A.
31. Agroquímica Industrial Rimac S.A.
32. B.C. Biotécnica Centroamericana S.A.
33. Coperativa de Productores de Café y de Servicios Múltiples de Naranjo R.L.
34. Equipo de Ordeno Laser
35. La Casa del Agricultor
36. Linda Vista S.A.
37. CoopeMontecillo
38. Fundación Noetrópica
39. Desarrollo Rural Peninsular
40. Distribuidora Alrovidas S.A.
41. Banco Internacional de Costa Rica
42. Banco Nacional
43. Ingenio Taboga S.A.
44. Proyecto C.E.E. ALA/89-21 Reordenamiento Agrario y Desarrolo Rural Integrado
45. CINDE
46. Rhone-Poulenc R.P.A. de Costa Rica S.A.
47. Bananera Lomas de Serpe S.A.
48. Agrocosta "Agroquímicos DAF de Costa Rica"
49. Dirección General Forestal
50. Hortifruit

51. Standard Fruit Company
52. DEMASA
53. Macadamia de Costa Rica
54. Dow Elanco
55. Geest Caribbean Americas Ltda.
56. PINDECO
57. BANDECO
58. La Hilda
59. Fertilizantes de Centro América
60. Irrigación Centroamericana S.A.
61. H.Z. Purdy S.A.
62. Compañía Bananera D.G. Estrada S.A.
63. Exportaciones Prococo S.A.
64. Ornamentales del cNorte S.A.
65. Planta de Interiores
66. Ornamentales Siempre Verbe S.A.
67. ASD de Costa Rica
68. Coope Agropal R.L.
69. Cabo Marzo S.A.
70. Agropecuaria Reyna S.A.
71. Alaplanta S.A.
72. Fernexport S.A.
73. Folliage Incorporated S.A.
74. Grupo Costarricense de ganaderos S.A.
75. Hacienda Tempisque S.A.
76. Chiquita Branda
77. Del Río Flaores Tropicales
78. Compañía Bananera La Estrella
79. Frutas Tropicales Venecia S.A.
80. Sábila Industrial S.A.
81. Programa Pocotsi
82. FUCODES INFOCOOP
83. Escuela Centroamericana de Ganadería
84. Asociación Cooperativa Canadiense
85. Convenio INFOCOOP-Swisscontac
86. Pillar Internacional S.A.
87. La Chiquita Agropecuaria S.A.
88. Colegio de Ingenieros Agrónomos
89. TICO FRUIT
90. UNIBAN
91. Palma Tica
92. Corporación Bananera Nacional (CORBANA)
93. PORTICO S.A.
94. Finca Privada Diversificada
95. Finca Privada
96. Finca Chicones S.A.
97. American Flower Corp. S.A.
98. Hacienda Ojo de Agua
99. Asociación ANDAR
100. CORICAFE S.A.

101. Ganadera El Coyol S.A.
102. Exportadora de Café Tournon S.A.
103. Melones de Costa Rica
104. Productos Roche S.A.
105. Corporación Ricaflor S.A.
106. Expo Rica Internacional S.A.
107. Flores de Costa Rica Internaciona R&M
108. Río Tapezco Ltda.
109. Costarricense de Palmito S.A.
110. Melones del Pacífico S.A.
111. Quimicas Unidas Ltda.
112. Corporación S&M
113. Finca Ganadera Los Maizoles
114. Naturanja - Jugos Naturales
115. Blanco Y Negro S.A.
116. Villa Ligia
117. Flores del Izarú S.A.
118. Porcina Americana S.A. Grupo Zeta
119. Compañía Continental S.A.
120. Asociación Costarricense de Desarrollo
121. Compañía Bananera Atlántica Ltda.
122. PIMA
123. Exportadores Peters y Co. S.A.
124. Fruta Tica S.A.
125. Compañía Bananera Bribrí S.A.
126. CECA S.A.
127. Coopertiva de Productores de Leche R.L.
128. Universidad Nacional
129. Ministerio de Agricultura y Ganadería
130. COOPEAGRI R.L.
131. CIMMYT
132. Finca Ganadera Rosemary
133. FUNDECOR/FORESTAL
134. SENARA
135. Consejo Nacional de Producción
136. Instituto de Desarrolo Agrario
137. Proyecto de Desarrollo Rural Integrado GNR-CEE/OSA.GOLFITO/NA 85-06
138. Abonos Superiores S.A.
139. Oficina Nacional de Semillas
140. Corporación Algüero
141. Centro Agrícola Contonal Mora
142. ICAFE-MAG
143. Centro de Investigaciones en Café (CICAFE)
144. Instituto del Café de Costa Rica
145. Bayes de Costa Rica
146. Bananera Canta Gallo S.A.
147. Cooperativa Agrícika de Llano Grande de Cartago R.L.
148. Coope Indio R.L.
149. Coope Cafira R.L.
150. Cooperativa Agrícola Industrial Victoria R.L.

151. Coopro Naranjo R.L.
152. Cooperativa de Caficultores de Tilaran R.L.
153. Cooperativa de Caficultores de Jorco R.L.
154. Tropical Rainbow
155. Inversiones Agropecuarias Tarena S.A.
156. Asociación de Criadores de Ganado Holstein
157. Hacienda Horizonte
158. Hacienda Vieja Limitada
159. Café Capris S.A.
160. Agroforestal El Ensayo S.A.
161. Agrícola Exportadora del Atlántico S.A.

APPENDIX D. COVER LETTER AND INITIAL QUESTIONNAIRE IN SPANISH

17 de enero de 1995

DIR/154-94

Señora
Patricia Alfaro
Supervisora Dpto. Reclutamiento y Selección
HORTIFRUTI S.A.
Apartado 56-1000 San José

Estimada Señora Alfaro:

Este es un estudio que estamos haciendo entre las empresas, instituciones y organizaciones que consideramos empleadores potenciales de futuros Ingenieros Agrónomos en Costa Rica. Queremos identificar las destrezas, conocimientos y actitudes requeridas por entidades relacionadas con la agricultura, el medio ambiente y productores al momento de contratar a un profesional con el título de Ingeniero Agrónomo con grado de Licenciatura.

El objetivo de este estudio es conocer las necesidades del mercado laboral, y así preparar a nuestros estudiantes dentro de un marco realista y en franco proceso de desarrollo, que satisfaga las expectativas de sus futuros empleadores.

El propósito de esta carta es el de solicitar su colaboración voluntaria. Queremos que nos dé su opinión en cuanto a los requisitos profesionales y técnicos que empresa, instituciones u organizaciones similares a la que usted representa exigen al momento de contratar un Ingeniero Agrónomo. Para ello hemos adjuntado dos copias de nuestro cuestionario; siendo éstas las herramientas principales para poder llevar a cabo nuestra investigación.

El cuestionario se contesta en 20 o 25 minutos aproximadamente. Estos deben ser respondidos por un miembro del personal administrativo (copia celeste) y

un miembro del personal técnico (copia amarilla) de su empresa. Apreciaríamos que usted responda al cuestionario del área que usted considere conveniente.

Si desea obtener información sobre los resultados de este estudio, al final de cada cuestionario se ha dejado un espacio para que nos indique el nombre y dirección de los interesados. De igual manera, si tiene comentarios con respecto al cuestionario considérese en toda libertad de incluirlos al final del mismo.

Además, este estudio constituirá la base de el estudio a nivel doctoral de la Ing. Xenia Ceville en la Universidad Estatal de Iowa en los Estados Unidos.

Le agradecemos por su valiosa colaboración; para facilitar su envío hemos incluído un sobre con su respectiva estampilla, para que nos sea remitido por correo.

Un cordial saludo,

José A. Zaglul Ph.D
Director General

Xenia L. Ceville
Profesora/Investigador

#179-B

ENCUESTA PARA IDENTIFICAR CONOCIMIENTOS Y APTITUDES REQUERIDAS EN UN INGENIERO AGRONOMO

Le hemos enviado este cuestionario por considerar a la empresa/institución/organización en donde usted trabaja, un empleador potencial de futuros Ingenieros Agrónomos en Costa Rica.
El propósito de esta encuesta es el de identificar los conocimientos y aptitudes que una empresa/institución/organización requiere que un Ingeniero Agrónomo posea al ser contratado.

El cuestionario tiene tres secciones, cada una al inicio tiene las instrucciones para responderla. Cabe señalar que la información que se nos brinde en este cuestionario será manejada de manera confidencial. Además, queremos indicarle que llenar este cuestionario no le tomará más de 20 a 30 minutos.

SECCION I

En esta sección presentamos una lista de conocimientos teóricos y prácticos. Sus respuestas como representante de un empleador potencial nos ayudarán a identificar las área prioritarias en las que un Ingeniero Agrónomo debe estar preparado para responder a las expectativas del empleador.

1. Basado(a) en el tipo de operación de la empresa/institución/organización que usted representa, priorice las siguientes actividades técnicas de acuerdo al grado de importancia que estas tengan. **Por favor dé una prioridad a cada una de las actividades abajo listadas.**
La escala a usar es de 1 a 7, siendo 1 no prioritario y 7 muy prioritario.

Producción agrícola ..... ____
Producción animal ..... ____
Producción forestal ..... ____
Manejo de recursos naturales ..... ____
Ingeniería y mecanización agrícola ..... ____
Manejo pos-cosecha del cultivo..... ____
Procesamiento de productos agrícolas... ____

2. Basado(a) en el tipo de operación de la empresa/institución/organización que usted representa, priorice las siguientes aptitudes técnico/prácticas de acuerdo al grado de importancia que estas tengan. **Por favor dé una prioridad a cada una de las actividades abajo listadas.**
La escala a usar es de 1 a 7, siendo 1 no prioritario y 7 muy prioritario.

Aplicar conceptos teórico/prácticos sobre Sostenibilidad..... ____
Manejo de la empresa, compañía, negocio, finca, etc. de manera empresarial..... ____
Aptitud en cuanto las labores de campo..... ____
Uso de computadoras, información cuantitativa y científica..... ____
Relaciones interpersonales..... ____
Capacidad de commnicarse..... ____
Capacidad para diseminar información..... ____

Por favor, opine sobre la importancia de cada uno los conocimientos teórico/prácticos y aptitudes que hemos listado bajo cada una de las áreas generales, al momento de contratar a un Ingeniero Agrónomo.
La escala a usar en esta sección es de 1 a 5, siendo 5 muy importante y 1 no importante. Por favor dé su opinión en cada uno de los ítems. Si considera importante agregar otra categoría, colóquela en en el espacio dado para Otra y señale la importancia que usted considera que tiene.

1. *Producción animal* Conocimientos sobre:	no es importante				muy importante
Ganado para carne	1	2	3	4	5
Ganado para leche	1	2	3	4	5
Ganado para doble propósito	1	2	3	4	5
Porcinos	1	2	3	4	5
Caprinos	1	2	3	4	5
Ovinos	1	2	3	4	5
Aves	1	2	3	4	5
Crustáceos	1	2	3	4	5
Peces	1	2	3	4	5
Otra (especifique y marque un número)_____	1	2	3	4	5

2. *Producción agrícola* Conocimientos en:	no es importante				muy importante
a. Cultivos tradicionales:					
Granos	1	2	3	4	5
Hortalizas	1	2	3	4	5
Plantas medicinales	1	2	3	4	5
Raíces y tubérculos	1	2	3	4	5
Frutales	1	2	3	4	5
Ornamentales	1	2	3	4	5
Industriales	1	2	3	4	5
Otra (especifique y marque un número)_____	1	2	3	4	5
b. Cultivos no-tradicionales:					
Granos	1	2	3	4	5
Hortalizas	1	2	3	4	5
Plantas medicinales	1	2	3	4	5
Raíces y tubérculos	1	2	3	4	5
Frutales	1	2	3	4	5
Ornamentales	1	2	3	4	5
Industriales	1	2	3	4	5
Otra (especifique y marque un número)_____	1	2	3	4	5

3. *Producción Forestal* Capacidad teórico-práctica para	no es importante				muy importante
Manejar bosques nativos.	1	2	3	4	5
Manejar plantaciones forestales.	1	2	3	4	5
Manejar viveros forestales.	1	2	3	4	5
Otra (especifique y marque un número)_____	1	2	3	4	5

Recuerde dar su opinión sobre cada uno de los ítems de la lista bajo el área técnica. Si considera importante agregar otra categoría,colóquela en el espacio dado para Otra y señale su importancia.

4.	***Manejo de recursos naturales*** **Tener capacidad para:**	**no es importante**				**muy importante**
	Planificar su uso potencial.	1	2	3	4	5
	Tomar decisiones sobre el manejo de desechos.	1	2	3	4	5
	Desarrollar actividades de ecoturismo.	1	2	3	4	5
	Desarrollar técnicas de conservación de suelos.	1	2	3	4	5
	Realizar estudios de impacto ambiental.	1	2	3	4	5
	Otra (especifique y marque un número)_____	1	2	3	4	5

5.	***Ingeniería Agrícola*** **Conocimientos sobre:**	**no es importante**				**muy importante**
	Construcciones rurales.	1	2	3	4	5
	Manejo de suelos y aguas.	1	2	3	4	5
	Maquinaria agrícola.	1	2	3	4	5
	Topografía.	1	2	3	4	5
	Otra (especifique y marque un número)_____	1	2	3	4	5

6.	***Sostenibilidad*** **Capacidad para:**	**no es importante**				**muy importante**
	Producir usando técnicas que tiendan a reducir la contaminación ambiental.	1	2	3	4	5
	Producir y usar abonos orgánicos.	1	2	3	4	5
	Producir sin el uso de agro-químicos sintéticos (producción orgánica).	1	2	3	4	5
	Otra (especifique y marque un número)_____	1	2	3	4	5

7.	***Manejo post-cosecha*** **Estar preparado para:**	**no es importante**				**muy importante**
	Desarrollar sistemas adecuados de empaque de productos.	1	2	3	4	5
	Desarrollar sistemas adecuados de almacenamiento de productos.	1	2	3	4	5
	Identificar sistemas adecuados de manipulación y y transporte que disminuyan pérdidas.	1	2	3	4	5
	Otra (especifique y marque un número)_____	1	2	3	4	5

8.	***Procesamiento de productos*** **Tener los conocimientos para:**	**no es importante**				**muy importante**
	Analizar el valor agregado del procesamiento de alimentos.	1	2	3	4	5
	Identificar usos alternativos para productos.	1	2	3	4	5
	Procesar alimentos.	1	2	3	4	5
	Otra (especifique y marque un número)_____	1	2	3	4	5

Recuerde dar su opinión sobre cada uno de los ítems de la lista bajo el área técnica. Si considera importante agregar otra categoría, colóquela en el espacio dado para Otra y señale su importancia.

9. *Manejo de manera empresarial* **Capacidad para:**	no es importante				muy importante
Desarrollar estrategias de comercialización.	1	2	3	4	5
Planificar y realizar exportación de productos.	1	2	3	4	5
Realizar análisis financieros de proyectos o de la empresa.	1	2	3	4	5
Desarrollar estudios de factibilidad.	1	2	3	4	5
Incorporar los costos ambientales al tomar decisiones.	1	2	3	4	5
Pensar y actuar como un empresario.	1	2	3	4	5
Administrar y controlar el presupuesto.	1	2	3	4	5
Comprender y aplicar conceptos prácticos de contabilidad.	1	2	3	4	5
Aplicar conceptos prácticos de Calidad Total en sus actividades.	1	2	3	4	5
Desarrollar proyectos Eco-empresariales.	1	2	3	4	5
Otra (especifique y marque un número)_____	1	2	3	4	5

10. **Apto(a) para planificar y/o desarrollar las siguientes labores de campo**	no es importante				muy importante
Manejar y conservar suelos y aguas.	1	2	3	4	5
Manejar plaguicidas.	1	2	3	4	5
Desarrollar sistemas integrados de manejo de plagas.	1	2	3	4	5
Operar y dar mantenimiento a la maquinaria agrícola.	1	2	3	4	5
Usar métodos y técnicas preventivas de sanidad animal.	1	2	3	4	5
Formular raciones.	1	2	3	4	5
Manejar pasturas.	1	2	3	4	5
Construir infraestructuras rurales.	1	2	3	4	5
Realizar las labores rutinarias/diarias de una finca.	1	2	3	4	5
Manejar sistemas de registros.	1	2	3	4	5
Identificar y realizar métodos y técnicas adecuadas en reproducción animal.	1	2	3	4	5
Otra (especifique y marque un número)_____	1	2	3	4	5

11. *Uso de computadoras* **Capacidad para:**	no es importante				muy importante
Manejar programas básicos de computación.	1	2	3	4	5
Usar paquetes de manejo de datos.	1	2	3	4	5
Otra (especifique y marque un número)_____	1	2	3	4	5

Recuerde dar su opinión sobre cada uno de los ítems de la lista bajo el área técnica. Si considera importante agregar otra categoría, colóquela en el espacio dado para Otra y señale su importancia.

12. **Manejo de información cuantitativa y cualitativa para estar en capacidad de:**	**no es importante**				**muy importante**
Interpretar resultados estadísticos.	1	2	3	4	5
Analizar datos estadísticos.	1	2	3	4	5
Planificar, organizar y realizar encuestas.	1	2	3	4	5
Planificar y desarrollar investigación aplicada.	1	2	3	4	5
Planificar y desarrollar investigación en laboratorios y/o centros experimentales.	1	2	3	4	5
Tomar decisiones a partir del análisis de datos.	1	2	3	4	5
Otra (especifique y marque un número)_____	1	2	3	4	5

13. ***Relaciones Interpersonales*** **Capacidad para:**	**no es importante**				**muy importante**
Trabajar en grupo.	1	2	3	4	5
Delegar funciones.	1	2	3	4	5
Tomar decisiones.	1	2	3	4	5
Resolver conflictos.	1	2	3	4	5
Seleccionar, supervisar y evaluar personal.	1	2	3	4	5
Motivar e incentivar al personal.	1	2	3	4	5
Adaptarse a diversas condiciones de trabajo.	1	2	3	4	5
Trabajar sin supervisión.	1	2	3	4	5
Mantener una actitud positiva hacia el trabajo.	1	2	3	4	5
Otra (especifique y marque un número)_____	1	2	3	4	5

14. ***Comunicación*** **Capacidad para:**	**no es importante**				**muy importante**
Expresar efectivamente sus ideas por escrito.	1	2	3	4	5
Escribir informes técnicos.	1	2	3	4	5
Compresión de lectura técnica en español.	1	2	3	4	5
Expresar verbalmente sus ideas con claridad.	1	2	3	4	5
Compresión de lectura técnica en inglés.	1	2	3	4	5
Comunicarse efectivamente en inglés.	1	2	3	4	5
Usar audio visuales para facilitar la comunicación de ideas e información.	1	2	3	4	5
Comprender y seguir instrucciones.	1	2	3	4	5
Capacitar y adiestrar personal.	1	2	3	4	5
Otra (especifique y marque un número)_____	1	2	3	4	5

15. ***Diseminación de información*** **Capacidad para:**	**no es importante**				**muy importante**
Planificar, organizar y ejecutar actividades de extensión.	1	2	3	4	5
Brindar asistencia técnica.	1	2	3	4	5
Planificar, organizar y ejecutar actividades de desarrollo rural.	1	2	3	4	5
Otra (especifique y marque un número)_____	1	2	3	4	5

SECCION II

Descripción de la empresa/institución/organización. Por favor conteste todas las preguntas.

1. La empresa/institución/organización que usted representa puede ser clasificada como: (marque sólo una):

1. Privada ____
2. Estatal ____
3. Internacional ____
4. Otro_____

2. Según la principal operación a la que se dedica la empresa/institución/organización que usted representa, ésta se podría clasificar como de (marque sólo una):

1. Producción..... ____
2. Mercadeo y distribución..... ____
3. Crédito y finanza..... ____
4. Procesamiento de productos..... ____
5. Venta, reparación e instalación de equipo agrícola..... ____
6. Investigación y asistencia técnica..... ____
7. Desarrollo agrícola y comunitaria..... ____
8. Educación..... ____
9. Otro_____ ____

3. ¿En qué área específica opera la empresa/institución/organización que usted representa?: (marque todas las que apliquen):

Producción agrícola..... ____
Producción pecuaria..... ____
Producción hortícola..... ____
Producción de ornamentales de follaje..... ____
Producción de flores de corte..... ____
Venta de agroquímicos. ..... ____
Crédito agrícola..... ____
Maquinaria agrícola (venta y/o reparación)..... ____
Servicios de asistencia técnica..... ____
Capacitación/Educación..... ____
Procesamiento de productos (lácteos, cárnicos, frutas, vegetales, otros). ____
Exportación de productos agrícolas y/o pecuarios..... ____
Otra, especifique_____ ..... ____

4. Años de existencia de la empresa/institución/organización_____.

5. ¿Cuántas personas aproximadamente trabajan en actividades agrícolas? (marque sólo una)

1. menos de 25 personas___
2. de 26 a 50 personas ___
3. de 51 a 75 personas ___
4. de 76 a 100 personas ___
5. más de 100 personas ___

6. En los últimos tres años los graduados en agricultura, contratados por la empresa/institución/organización que usted representa, han sido empleados para trabajar en el (las) área(s) de (marque todas las que apliquen):

Producción agrícola ____
Producción animal ____
Producción forestal ____
Manejo de recursos naturales ____
Ingeniería y mecanización agrícola ____
Manejo pos-cosecha del cultivo ____
Procesamiento de productos agrícolas ____
Ventas ____
Mercadeo ____
Crédito y finanzas ____
Investigación ____
Extensión/Educación/Capacitación ____
Asistencia técnica ____
Administración ____
Otra: (especifique)_____ ____

7. Coloque al lado de la especialidad ¿cuántos profesionales en el área agrícola contempla contratar en los próximos dos años y cuántos de ellos serán Ingenieros Agrónomos? (número total para dos años para todas las que apliquen).

Especialidad	Número Total	Ingenieros Agrónomos
Producción agrícola	_____	_____
Producción animal	_____	_____
Producción forestal	_____	_____
Manejo de recursos naturales	_____	_____
Ingeniería y mecanización agrícola	_____	_____
Manejo post-cosecha del cultivo	_____	_____
Procesamiento de productos agrícolas	_____	_____
Ventas	_____	_____
Mercadeo	_____	_____
Crédito y finanzas	_____	_____
Investigación	_____	_____
Extensión/Educación/Capacitación	_____	_____
Asistencia técnica	_____	_____
Administración	_____	_____
Otra: (especifique)_____	_____	_____

8. Al momento de seleccionar los candidatos para una posición, la elección la hacen por medio de (marque todas las que apliquen) :

	Si	No
Entrevistas personales	___	___
Curriculum Vitae	___	___
Entrevistas telefónicas	___	___
Examenes teórico/prácticos	___	___

9. Algunas instituciones de educación tienen como requisito que antes que el estudiante reciba su título de Ingeniero Agrónomo, este debe realizar un internado, pasantía o trabajo pre-profesional en una empresa, organización o institución estatal o privada. Considera usted que esto ayuda al egresado al momento de concursar para un trabajo? (sólo marque una)

Si ___ No ___

SECCION III

Por favor conteste las siguientes preguntas relacionadas con su actividad laboral. Esta información será utilizada para análisis estadísticos globales y será estrictamente confidencial:

1.¿Cuántos años tiene de trabajar para la empresa/institución/organización que usted representa? _____(años).

2. ¿Cuál es su área de trabajo en la empresa/institución/organización que representa?(marque sólo una, la que mejor corresponda)

1. Área administrativa..... ____
2. Área técnica..... ____
3. Combinación de lo anterior..... ____
4. Otra (especifique)_____ ____

3. Marque su último grado académico obtenido (marque solo uno):

1. Bachiller de escuela secundaria..... ____
2. Técnico medio..... ____
3. Bachiller universitario..... ____
4. Licenciatura..... ____
5. Maestría..... ____
6. Doctorado..... ____

4. Especilidad de su último grado académico: _____

5. País en dónde recibió su último grado académico: _____

6. Su género: Masculino ____ Femenino ____

7. Su edad: _____

8. Nacionalidad: _____

Si está interesado en los resultados de este estudio, por favor indique el nombre y dirección a la que desea que le sean enviados. Cualquier comentario relacionado con el cuestionario o si desea agregar alguna otra información, por favor hágalo.

_____
_____
_____
_____
_____
_____

APPENDIX E. ENGLISH TRANSLATION OF THE COVER LETTER AND QUESTIONNAIRE

October, 1994

Dear Administrator and or Technician:

This letter is in regards to a study we are doing which focuses on the businesses, institutions and organizations in Costa Rica which we consider to be potential employers of future *Ingenieros Agronomos (Agriculturalists)*. We want to identify the skills, knowledge and abilities related to agriculture, farmers and the environment which entities that work in the agricultural sector consider to be important when hiring *Ingenerio Agronomos* graduating with the title of *Licenciatura.*

The objective of this study is to assess the needs of the labor market in this area to be able to prepare our students within a realistic and progressive framework that will satisfy the expectations of the future employers of agriculturalists.

The objective of this letter is to ask for your collaboration. We would like to know your opinion with regard to the professional and technical requiremeents that businesses, institutions and organizations such as the one you represent require when hiring an *Ingeniero Agronomo*. For this purpose we have attached two copies of a questionnaire which is the basis on which we will carry out our research on this subject.

The questionnaire will take approximately 20 to 25 minutes to answer. One should be filled out by one member of your administrative staff and the other (the yellow copy) by a technical representative. We would appreciate it if you would fill out the questionnaire that you feel is appropriate.

If you would like to receive information about the results of this study, please provide us with your name and address in the space provided at the end of the questionnaire. Also, if you have comments about the questionnaire, please feel free to include these also.

Finally, we would like to let you know this research project will be the basis for a doctoral dissertation for Ing. Xenia Ceville at Iowa State University in the United States.

We thank you for your valuable collaboration. We have invluded an addressed and stamped envelope for your convenience.

Sincerely,

Xenia Ceville
Professor and Researcher

Robert Martin, Ph.D.
Professor and Researcher

SKILLS AND KNOWLEDGE REQUIRED BY COSTA RICAN AGRICULTURALISTS TO BE HIRED

The purpose of this questionnaire is to obtain your perceptions regarding skills and knowledge needed by Agriculturalists to be hired by the entity you represent.

We have sent you this questionnaire because the entity you are representing is considered to be a potential employer of future agricultural graduates in Costa Rica.

This questionnaire has three sections, each section has instructions of how you should answer it. The information provided in this questionnaire will be handled with confidentiality. It will take you 20 to 30 minutes to answer it.

SECTION I

This section presents a list of theoretical and practical skills and knowledge. Your responses as representative of a potential employer will help us identify priority areas in which and Agriculturalists should have skills and knowledge in order to be hired.

1. Based on you work experience please rate the importance you perceive of each of the skills and knowledge listed below when hiring an Ingeniero Agónomo with a Licenciatura degree in the company/institution/organization you represent.

Use the rating scale of 7 to 1 with 7 being the highest priority an 1 the lowest.

Agricultural Production ____
Animal Production ____
Forestry Production ____
Natural resource management ____
Agricultural Engineering and mechanization ____
Post-harvest management ____
Food processing ____

2. Based on the type of operation the company/institution/organization you represent, according to the level of importance prioritize the following attitudes towards the following technical/practical areas listed bellow. The rating should be on a scale from 7 to 1, 7 being most important and 1 not important.

Applying theoretical and practical concepts of sustainability ____
Use of management skills when managing a company, farm, business ____
Skilled in filed related activities ____
Use of computers, quantitative and scientific inf. ____
Training good interpersonal relationships ____
Demonstrating good communication skills ____
Demonstrating skills in disseminating information ____.

Please give your perception regarding each of the practical/theoretical knowledge and skills that have been listed under each general area, when hiring and Agriculturalists. The scale is from 1 to 5, being not important and 5 very important. At the end of each group you will find a space given for OTHER, this is in case there is a skill or knowledge that has not been listed and you which to include and rank.

1.	*Animal Production* Knowledge about:	not important				very important
	Beef cattle	1	2	3	4	5
	Milk cattle	1	2	3	4	5
	Milk and beef cattle	1	2	3	4	5
	Swine	1	2	3	4	5
	Goats	1	2	3	4	5
	Sheep's	1	2	3	4	5
	Poultry	1	2	3	4	5
	Fish	1	2	3	4	5
	Other_____	1	2	3	4	5
2.	*Agriculture Production* Knowledge about:	not important				very important
	a. Traditional crops:					
	Grains	1	2	3	4	5
	Horticulture	1	2	3	4	5
	Medicinal Plants	1	2	3	4	5
	Roots and Tubers	1	2	3	4	5
	Fruits	1	2	3	4	5
	Ornamentals	1	2	3	4	5
	Industrial crops	1	2	3	4	5
	Other_____	1	2	3	4	5
	b. Non-traditional crops					
	Grains	1	2	3	4	5
	Horticulture	1	2	3	4	5
	Medicinal Plants	1	2	3	4	5
	Roots and Tubers	1	2	3	4	5
	Fruits	1	2	3	4	5
	Ornamentals	1	2	3	4	5
	Industrial crops	1	2	3	4	5
	Other_____	1	2	3	4	5
3.	*Forestry Production* Theoretical and practical ability to:	not important				very important
	Manage native forest	1	2	3	4	5
	Manage forestry plantations	1	2	3	4	5
	Manage forestry greenhouses	1	2	3	4	5
	Other_____	1	2	3	4	5

Remember to rank each of the items listed bellow and if you consider that we have not listed an item and it is important please include it and rank it also.

4. *Natural resource management* Be able to:	not important				very important
Plan potential use of it	1	2	3	4	5
Make decisions about waste management	1	2	3	4	5
Develop ecoturism activities	1	2	3	4	5
Develop soil conservation techniques	1	2	3	4	5
Conduct studies regarding environmental impact	1	2	3	4	5
Other _____	1	2	3	4	5

5. *Agricultural Engineering* Knowledge about:	not important				very important
Rural constructions	1	2	3	4	5
Soils and water management	1	2	3	4	5
Agricultural equipment	1	2	3	4	5
Topography	1	2	3	4	5
Other_____	1	2	3	4	5

6. *Sustainability* Ability to:	not important				very important
Produce using techniques that help reduce contamination	1	2	3	4	5
Produce and use organic fertilizers	1	2	3	4	5
Produce without using agro-chemicals	1	2	3	4	5
Other_____	1	2	3	4	5

7. *Post-harvest management* Be prepared to:	not important				very important
Develop adequate packing systems	1	2	3	4	5
Develop adequate storing systems	1	2	3	4	5
Identify adequate systems that reduce product loss when handling and transporting	1	2	3	4	5
Other_____	1	2	3	4	5

8. *Food processing* Have the knowledge to be able to:	not important				very important
Analyze the added value of processing food	1	2	3	4	5
Identify alternative use for products	1	2	3	4	5
Process food	1	2	3	4	5
Other_____	1	2	3	4	5

Remember to rank each of the items listed bellow and if you consider that we have not listed an item and it is important please include it and rank it also.

12. Quantitative and qualitative information management, to be able to:	not important				very important
Interpret statistical results	1	2	3	4	5
Analyze statistical data	1	2	3	4	5
Plan, organize and conduct surveys	1	2	3	4	5
Plan and develop applied research	1	2	3	4	5
Plan and develop research for laboratory and research stations	1	2	3	4	5
Make decisions based on data analysis	1	2	3	4	5
Other_____	1	2	3	4	5

13. *Interpersonal relationships* Ability to:	not important				very important
Work in groups	1	2	3	4	5
Delegate	1	2	3	4	5
Make decisions	1	2	3	4	5
Solve conflicts	1	2	3	4	5
Select, supervise and evaluate personnel	1	2	3	4	5
Motivate and incentive personnel	1	2	3	4	5
Adapt to different work conditions	1	2	3	4	5
Work without supervision	1	2	3	4	5
Maintain a positive attitude toward work	1	2	3	4	5
Other_____	1	2	3	4	5

14. *Communication* Ability to:	not important				very important
Express effectively written ideas	1	2	3	4	5
Write technical reports	1	2	3	4	5
Comprehend technical reports written in Spanish	1	2	3	4	5
Express correctly ideas verbally	1	2	3	4	5
Comprehend technical reports written in English	1	2	3	4	5
Communicate effectively in English	1	2	3	4	5
Use correctly of audic visual when communicating ideas	1	2	3	4	5
Comprehend and follow instructions	1	2	3	4	5
Ability to train personnel	1	2	3	4	5
Other_____	1	2	3	4	5

Remember to rank each of the items listed bellow and if you consider that we have not listed an item and it is important please include it and rank it also.

15. *Disseminate information* Ability to:	not important				very important
Plan, organize and conduct extension activities	1	2	3	4	5
Provide technical assistance	1	2	3	4	5
Plan, organize and conduct rural development activities	1	2	3	4	5

SECTION II

Description of the company/business/institution/organization. Please answer all the questions.

1. The business/institution/company/organization that you represent could be classified as: (mark only one):

1. Private ___
2. Governmental ___
3. International ___
4. Other_____

2. According to the company/business/institution/organization principal operation, it could be classified as: (mark only one):

1. Production ____
2. Marketing and distribution ____
3. Credit and finances ____
4. Products processing ____
5. Agricultural equipment sales, repair, and installation ____
6. Research and technical assistance ____
7. Community and agricultural development ____
8. Education ____

3. Indicate the specific operation area of the company/business/institution/organization you represent. (mark all those that apply):

Agricultural production
Animal production ____
Horticulture production ____
Ornamental production ____
Flower production ____
Agro-chemical sales ____
Agricultural credit ____
Agricultural equipment (sales/repair) ____
Technical assistance services ____
Training/Education ____
Food processing ____
Expert of agricultural and animal production products ____

4. Years of existence of the company/business/institution/organization you represent. _____

5. Number of people in company/business/institution/organization you represent. working in agricultural activities. (mark only one).

1. less than 25 persons _ ___
2. 26 to 50 persons ____
3. 51 to 75 persons ____
4. 76 to a 100 persons ____
5. more than a 100 persons ____

6. En the last three years graduates from agricultural sciences employed by company/business/institution/organization you represent, have being hired to work in the areas of: (mark all those that apply):

Agriculture production	____
Animal production	____
Forestry production	____
Natural resource management	____
Agricultural Engineering and mechanization	____
Post-harvest management	____
Sales	____
Marketing	____
Credit and finance	____
Research	____
Extension/Education/Training	____
Technical assistance	____
Administration	____
Other_____ ___ ___	____

7. Specify beside each specialization the number of professionals the company/business/institution/organization you represent plans to hire en the coming two years. Of those hired how many will be Agriculturalists?

Area of Specialization	Total employed	# of Agriculturalists employed
Agriculture production	____	____
Animal production	___	____
Forestry production	____	____
Natural resource management	___	
Agricultural Engineering and mechanization	____	____
Post-harvest management	_	
Sales	___	
Marketing	____	____
Credit and finance	____	____
Research	____	____
Extension/Education/Training	____	____
Technical assistance	____	____
Administration	___	____
Other_____ _____ ____		____

8. When hiring the selection of the candidates is made through using the following (mark all that apply):

	yes	no
Personal interviews		___
Curriculum Vitae	___	___
Phone interviews	___	___
Technical/Practical Exams	___	___

9. Some Educational Institutions require that before a student graduate as an Agriculturalists, they should go through an internship program in a business, organization, governmental or non-governmental institution. Do you consider this a valuable practice that would help a graduate to obtain a job? (mark only one)

YES ___ NO___

SECTION III

Please answer the following group of questions, they will provide information regarding your job responsibilities and help describe the respondent. The information provided in this section will be treated as confidential information same as previous information provided by the respondent.

1. How many years have you worked with the company/business/institution/organization you represent (years).

2. Please mark your job area (mark only one):

1. Administrative area ___
2. Technical area ___
3. Combination of administrative and technical area ___
4. Other_____

3. Last degree obtained (mark only one):

1. High school degree ___
2. Technical degree ___
3. Bachelors degree ___
4. *Licenciatura* ___
5. Masters degree ___
6. Ph.D. ___

4. Area of specialization of you last degree obtained _____

5. Country in which you obtained your last degree _____

6. Gender: Male ___ Female ____

7. Age: __

8. Nationality: _____

If you are interested in the results of this study, please indicate name and address where the information should be mailed when available. Feel free to make any comment(s) regarding the questionnaire or to include any additional information that feel is necessary.

_____
_____
_____
_____
_____

THANKS FOR YOUR COOPERATION

APPENDIX F. HUMAN SUBJECTS CONSENT FORM

Last Name of Principal Investigator Renie L. Deville

Checklist for Attachments and Time Schedule

The following are attached (please check):

12. [X] Letter or written statement to subjects indicating clearly:
    a) purpose of the research
    b) the use of any identifier codes (names, #'s), how they will be used, and when they will be removed (see Item 17)
    c) an estimate of time needed for participation in the research and the place
    d) if applicable, location of the research activity
    e) how you will ensure confidentiality
    f) in a longitudinal study, note when and how you will contact subjects later
    g) participation is voluntary; nonparticipation will not affect evaluations of the subject

13. [ ] Consent form (if applicable)

14. [ ] Letter of approval for research from cooperating organizations or institutions (if applicable)

15. [X] Data-gathering instruments

16. Anticipated dates for contact with subjects:

First Contact	Last Contact
October 20, 1994	December 15, 1994
Month / Day / Year	Month / Day / Year

17. If applicable: anticipated date that identifiers will be removed from completed survey instruments and/or audio or visual tapes will be erased:

January 15, 1995
Month / Day / Year

18. Signature of Departmental Executive Officer | Date | Department or Administrative Unit

/s/ Richard Hunter | 9-27-94 | Ag Ed S

19. Decision of the University Human Subjects Review Committee:

[X] Project Approved [ ] Project Not Approved [ ] No Action Required

Patricia M. Keith
Name of Committee Chairperson

10/6/94
Date

PMKeith
Signature of Committee Chairperson

GC:1/90

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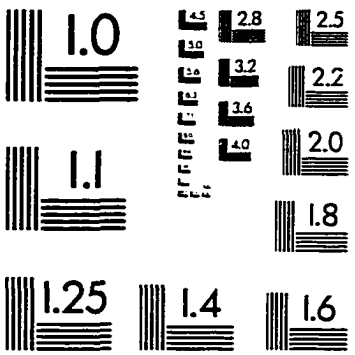
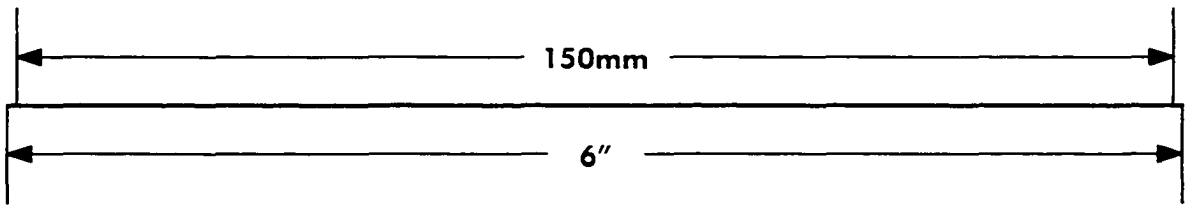
IMAGE EVALUATION TEST TARGET (QA-3)





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